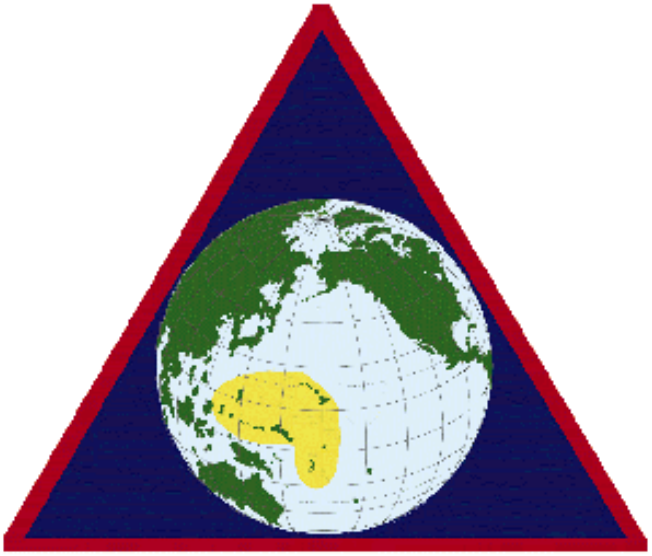
PACIFIC DISASTER CENTER

CONCEPT OF OPERATIONS



March 1998

EXECUTIVE SUMMARY

The Pacific Disaster Center (PDC) is a federal activity for information processing and analysis, delivering critical information products to emergency managers during disaster conditions and crisis situations. This Concept of Operations (CONOPS) provides a high-level description of the PDC, including its organizational structure and operating concepts to achieve the defined mission and objectives.

Support to regional emergency management is the foundation for PDC operations. Emergency management is described in this document as a cycle with phases consisting of mitigation, preparedness, response, and recovery. The PDC complex information processing cycle, comprising collection, fusion, analysis, production, and dissemination, supports emergency management in each of these phases. This cycle and the automated information system used to create and disseminate comprehensive emergency management products are defined in this document.

The Pacific Region emergency management entities that the PDC supports include agencies and offices at federal, state, and local levels and departments in the Pacific Insular States. The CONOPS provides specific information on these emergency management organizations and the systems used to ensure connectivity.

The PDC Operations are structured to conduct normal operations and limited contingency operations in response to disaster and crisis events. Full contingency operations for extended periods of time in response to protracted disasters are planned following the training of required surge personnel. Current and conceptual operational procedures designed to meet these requirements are also presented in the CONOPS.

The policies contained in this document will guide the development and enhancement of the PDC. The CONOPS will be amended as necessary to reflect new partnerships and requirements in the region.

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Section 1

INTRODUCTION

1. INTRODUCTION

The Pacific Disaster Center (PDC), located in Maui, Hawaii, is a federal activity under the direct sponsorship and management of the Department of Defense (DoD). This federal center for information processing and analysis is chartered to provide timely data and tailored comprehensive information products to federal, state, local, and regional entities involved in emergency management in the Pacific Region. To provide this critical information, PDC collects data and information from various resources and modeling activities and uses advanced computing assets to fuse data sets and perform analysis. PDC then employs automated information systems to develop tailored emergency management products and disseminates these products via a robust, diverse, and redundant communications architecture. These capabilities provide assistance throughout the four phases of comprehensive emergency management and improve vital communications processes in order to share critical information among emergency managers.

As shown in **Figure 1-1**, emergency management activities often overlap across one or more of the phases. Throughout each of these phases, PDC monitors and provides information products for nine natural disaster phenomena (**Figure 1-2**) that can impact the Pacific Region.

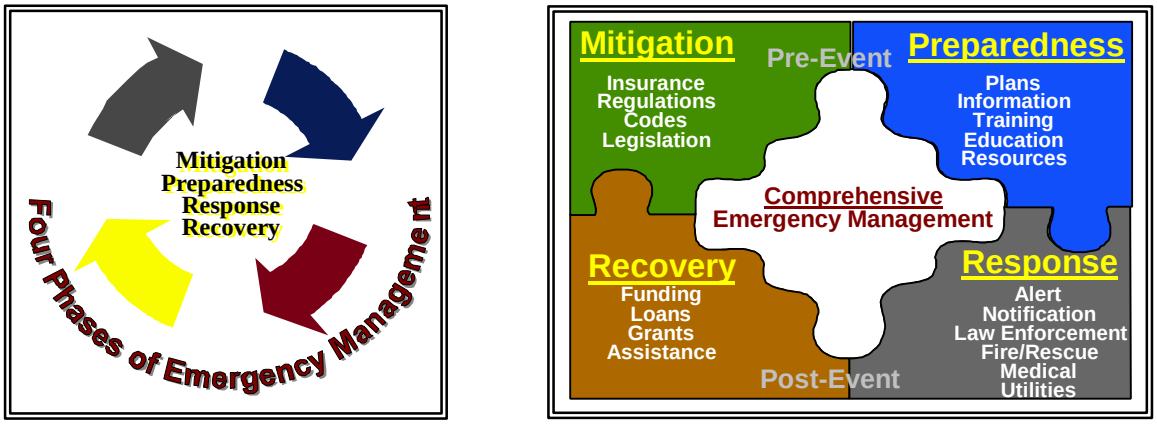

Figure 1-1: The Emergency Management Cycle

The PDC is located in Kihei, Maui, in the Maui Research and Technology Park, with a PDC node collocated with the Hawaii State Civil Defense (SCD) Emergency Operations Center in Diamond Head Crater, Oahu. Information flows between the PDC nodes and PDC users via a system of local area networks (LANs) which comprise a digital data intranet and connection to the Internet and World Wide Web (www).

Disaster Phenomena

Major Phenomenon	Associated Effects
• Tropical Cyclone Activity (Hurricane, Typhoon, Tropical Storm)	• High Surf • Storm Surge • Thunderstorms, Waterspouts • Local Flooding • High Wind Effects
• Severe Storm Activity (Squall or Cold Front)	• High Surf • Thunderstorms • Lightning, Hail, Waterspouts • Torrential Rains, Local Flooding • High Wind Effects
• Tsunami	• Coastal Inundation • Debris Loading
• Earthquake	• Landslides, Debris Shifts, Fires
• Volcanic Activity	• Fires, Health Hazards
• Local Flooding	• Flash Flooding, Debris Loading
• Drought	• Increased Wildfire Potential
• Wildfire	• Health Hazards
• Man-Made Disasters	• Hazardous Material Release • Transportation Disasters • Terrorist Action/Civil Disturbance • Energy Crisis

Figure 1-2: Disaster Phenomena

1.1. Background

Due to the expansiveness of the Pacific Region, it is a challenge for federal agencies to coordinate emergency management support to Hawaii and other islands in the Pacific from the U.S. mainland. To meet this challenge, the PDC was established in February 1996 to provide a focal point for information collection and timely dissemination to emergency managers throughout the Pacific Region. The PDC substantially improves the timeliness of dissemination of disaster notices from authorized organizations, offers products that speed disaster relief, and provides information to aid in disaster mitigation.

From inception of the PDC, a primary user of this technology has been the Hawaii State Civil Defense (SCD). Other PDC end-users at the state and local level include Hawaii County civil defense offices and local organizations involved in emergency management. At the regional level, PDC provides information and communications support to emergency managers represented by the Pacific Caucus of the Pacific Insular States (PIS).[1] Federal agencies with emergency management responsibilities in the region also interact with PDC. Agencies, such as

[1] American Samoa, Federated States of Micronesia, Marshall Islands, Guam, Palau, and Commonwealth of the Northern Marianas

the National Oceanic and Atmospheric Administration (NOAA), the U.S. Geological Survey (USGS), and the Federal Emergency Management Agency (FEMA), provide data to the PDC and receive PDC-developed products tailored to their specific needs. Most recently, PDC began a relationship with emergency managers in State of Alaska. This relationship is still developing but likely will encompass the exchange of data and products relating to disaster phenomena of mutual interest.

PDC is designed to support all levels of disaster management in the Pacific Region, from the local and state level, to federally-declared emergencies, to disasters that occur in the distant outlying Pacific Insular States. A complete description of the agencies supported by PDC technology and how the PDC interacts with them is found in sections 3 and 4.

1.2. PDC Mission

The primary mission of the PDC is:

> ***"To provide world-class information support to federal, state, local, and regional emergency managers in mitigation, preparedness, response, and recovery for environmental disasters within the Pacific Region."***

Through the use of technology, the PDC provides new ways of sharing information between regional, federal, state, and local agencies involved in emergency management. Information and data centrally located at PDC facilitates the development of a wide range of information products and access to these products by authorized participants.

The concept of a centralized, technology-centered disaster center has recently broadened to a national or global network of such centers. Current planning envisions a National Disaster Information Network (NDIN) or Global Disaster Information Network (GDIN). The success of the PDC as an information processing center will provide a model for a prototype node in such a network; therefore, the secondary mission of the PDC is:

> ***"To serve as an organizational and technological model for global, national and local initiatives in environmental disaster information management."***

1.3. Future

The PDC will achieve an enhanced system capability (ESC) in June 1998. ESC will include a fully interoperable, multilayered geographic information system (GIS) capability for the creation of new and enhanced emergency management products; an expanded database with national, regional, and local data; improved disaster modeling capabilities; and a robust, redundant communications infrastructure.

PDC operations, including analysis, modeling, product generation, and network and communication support, are currently performed primarily by DOD contractor personnel. After the PDC has achieved enhanced systems capability, it is envisioned that PDC staffing will be supplemented by analysts, scientists, researchers, and other experts from regional federal

agencies and educational institutions such as the FEMA, USGS, NOAA, National Weather Service (NWS), National Air and Space Administration (NASA), University of Hawaii, Scripps Institution of Oceanography, and others.

1.4. Overview

The following sections describe the PDC and its operation in support of emergency managers in the Pacific Region. First, a technical description of the PDC is presented, identifying the configuration and functions that allow the PDC to fulfill its mission. The next section addresses PDC interfaces with the various entities from which it receives data and to whom it provides emergency management information support. A discussion of the communication infrastructure is also provided. The final section describes how the PDC operates as a system to support the emergency management environment, including a discussion of surge operations.

Section 2

PACIFIC DISASTER CENTER CONFIGURATION AND FUNCTIONS

2. PDC CONFIGURATION AND FUNCTIONS

The PDC employs an integrated set of hardware, software, networks, and manpower to collect, fuse, analyze, produce, and disseminate information products. These distinct activities can be described as components of the PDC information processing cycle. This section begins with an overview of the PDC configuration used to perform these activities, to include hardware, software, facilities, and underlying infrastructure. Next, the information processing cycle employed at the PDC is described. The PDC work activity encompasses seven functional operating areas (FOAs) to support the information processing cycle and perform product development. A description of these FOAs and how they support the information processing activities is included as Appendix A. Lastly, a production schema describe product and capability grouping by a hierarchy of complexity and processing level.

2.1. System Configuration

The PDC comprises two nodes. The primary operational analysis and production center in Maui is responsible for end-to-end production and dissemination of emergency management products. The node collocated with SCD in Diamond Head Crater has the primary responsibility of providing communications access to all PDC users. Its secondary purpose is to act as a partial backup facility in the event of a disruption of processes on Maui. **Figure 2-1** shows the relationship between PDC nodes, users, and data sources.

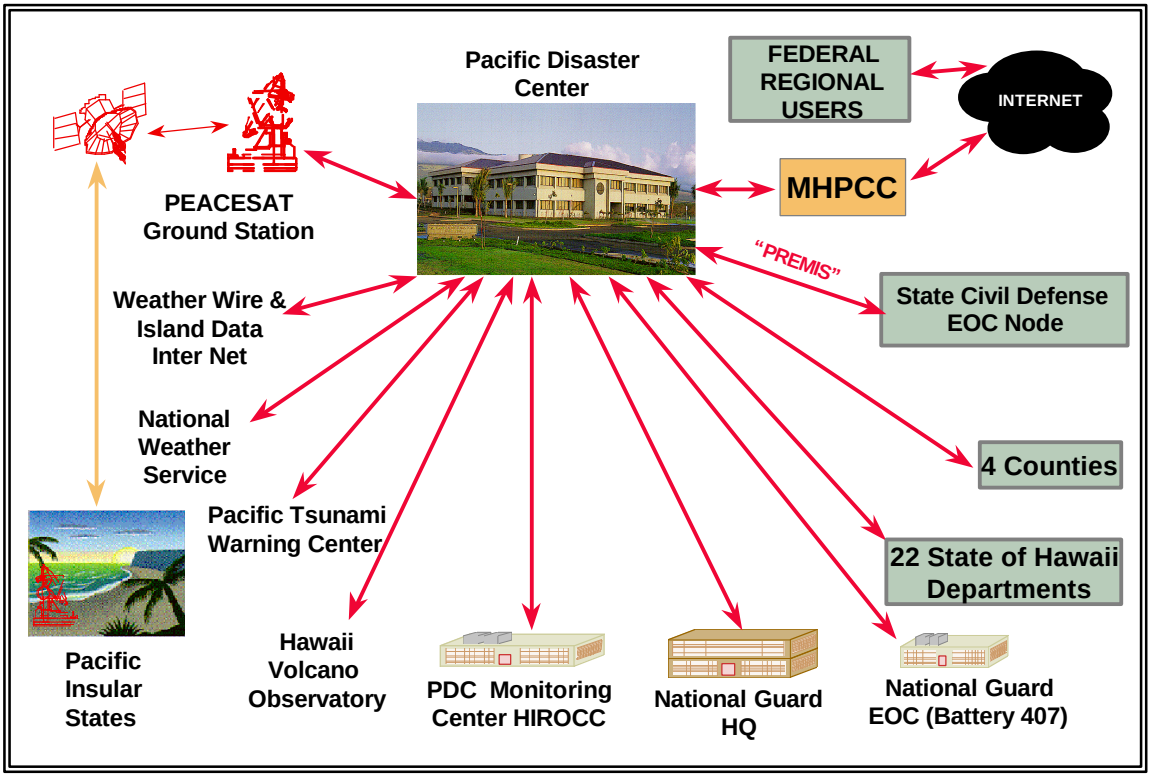

Figure 2-1: The PDC Architecture

The PDC can be described as a digital processing system. To provide the PDC capabilities and products, automated data processing (ADP) equipment, communications support, and tailored software applications are used. **Figure 2-2** identifies current and planned (shaded area) PDC system capabilities to support collection, fusion, analysis, production, and dissemination**.**

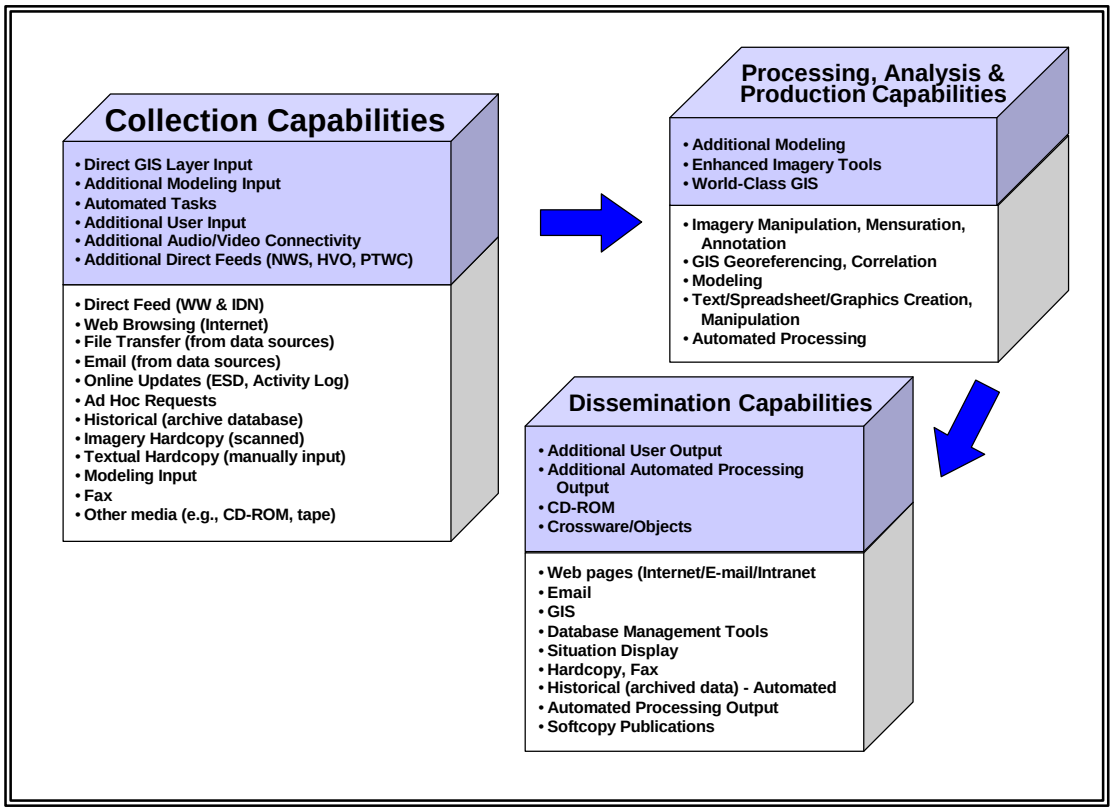

Figure 2-2: PDC Operational Capabilities

Figure 2-3 shows the current system components, lists the software package resident at each component, and highlights planned enhancements (in red). The current PDC system components and their functions comprise:

- Network - Provide a means to process information and connect to the emergency management community
- Firewall - Guard the system against unauthorized intrusion
- Analyst Tools - Allow PDC analysts to produce information products
- GIS Services - Allow geographic information to be processed, merged, and displayed in graphic or tabular products and disseminated
- Web Services - Provide digital connectivity and emergency manager home pages
- Database Services - Store and process emergency management information

- System Services - Provide routine services to analysts and emergency managers
- Modeling - Assess risk and consequences of potential or actual disaster events
- Automated Processing - Assist in the flow of information without human intervention

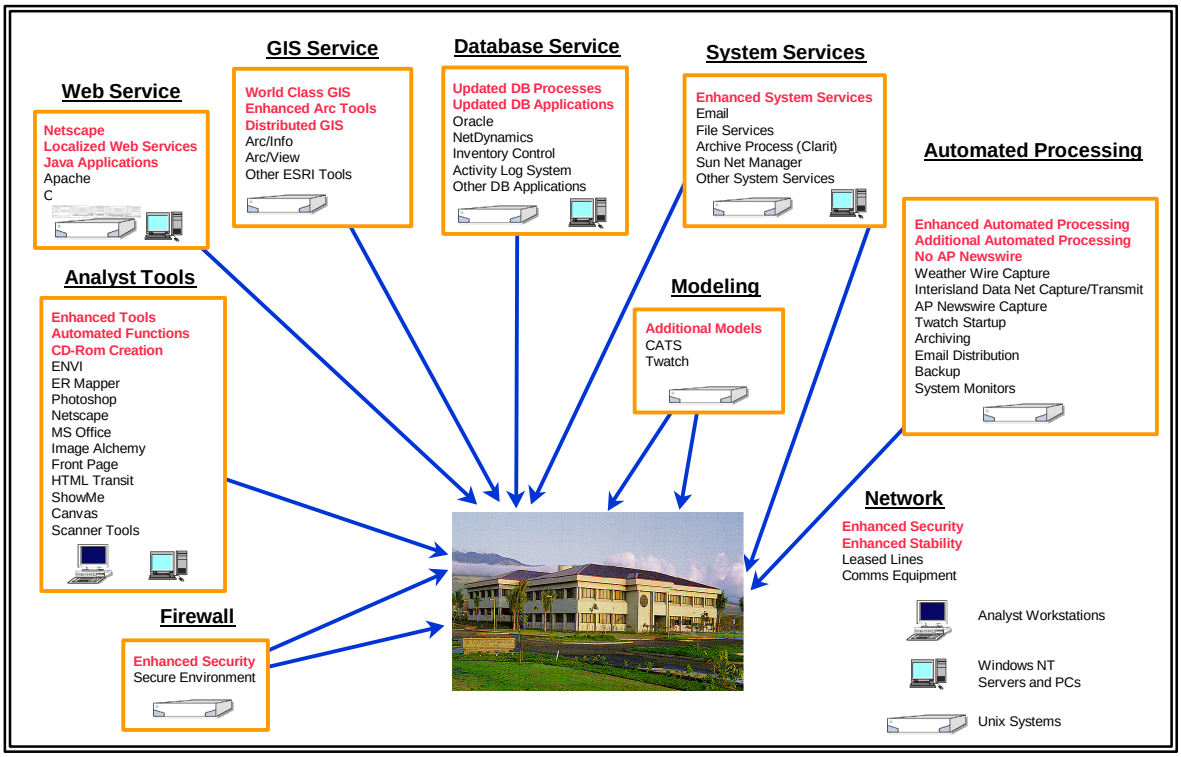

Figure 2-3: PDC System Configurations Planned Enhancements

The system enhancements to system components to be completed by June 1998 (Figure 2-3) include:

- Automated Processing - Additional automated processes to replace current labor-intensive methods
- Communications - Multiple communications paths to end users with higher capability to conduct rapid transmission of large data files and complex products
- Coordination Tool - Improved electronic situation display (ESD)
- Network - Tools and procedures to enhance network security and stability, new intranet connections, and new NWS server
- Firewall - Additional firewall and security procedures to provide an even more robust guard against unauthorized assess to private areas

- Home Page - New format allowing online user registration and secure, password-protected, mutually discreet internal sites for easy access and download of pre-requested products by event
- Analyst Tools - Additional software tools to produce enhanced products
- Web Service - Distributed Web service and interactive applications
- GIS Service - New GIS capabilities and a distributed GIS network
- Database Service - New, improved databases and Internet-compatible applications
- System Services - Enhanced maintenance, monitoring, and troubleshooting services
- Modeling - Access to additional models supported by the emergency management community and improved methods of invoking models

2.2. PDC Information Processing

The PDC information processing cycle, consisting of collection, fusion, analysis, production, and dissemination, is employed throughout the emergency management cycle. **Figure 2-4** shows the cross-functional relationship between the information processing cycle and the emergency management cycle. This cycle is further described in section 4.

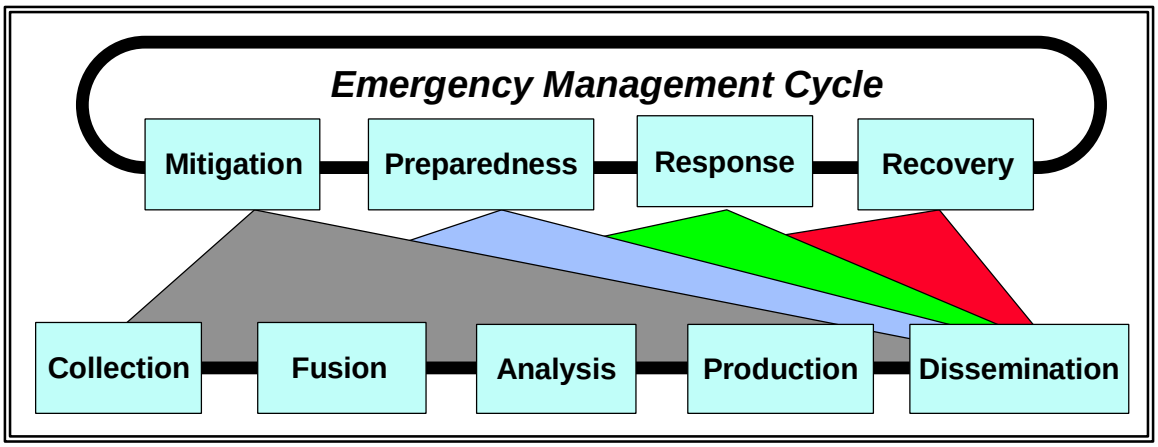

Figure 2-4: Information Processing Cycle

2.2.1. Collection

The information collection process involves identifying the types of information needed to develop the products that users have requested. Next, the sources, availability, accuracy, and format of existing data that meet such criteria must be determined and steps taken to access or incorporate the data into the PDC databases. Finally, information that is required but unavailable or extant must be identified and steps taken to obtain it. Collection processes are coordinated with the PDC federal sponsor to ensure acquisition of available data through appropriate means, to include governmental and commercial sources. PDC also develops procedures/capabilities to

obtain data when the needed data is not available. At times, PDC information collection and dissemination may be constrained by limitations or restrictions imposed by data providers.

2.2.1.1. Collection Media

Data is retrieved from various sources via the www, via PDC users using the Geographic Information System (GIS) and Electronic Situation Display (ESD), and via hard copy and electronic media such as satellite broadcasts, tapes, and CD-ROM. The www and the open-source Internet provide a rich source of disaster-related information such as weather-related text and graphics, imagery for specific events, modeling results, maps, and other geographic data for use as input and sources for the development of PDC products. Data is also collected via the PDC Web site from PDC users themselves. The ESD, an application available on the PDC Web site, allows authorized emergency managers to enter situation status reports and supporting maps and graphics in real-time. The PDC GIS map server capability allows authorized users to input GIS layer information specific to their agency and needs. Other means of data collection include E-mail, hard copy input, facsimile, CD-ROM, and magnetic tape.

2.2.2. Data

As input to the information processing cycle, various types of disaster-related information include:

- Alert information for all warnings, watches, notifications, and other messages where a quick reaction is required. Examples include hurricane warnings, tsunami watches, flash flood watches, and other disaster notifications.

- Situation information on current and pending disaster events. The PDC receives this information either automatically or by request. Examples include weather imagery, tsunami information, damage assessment reports, and text data from various sources.

- Results of consequence assessment and other types of models related to tsunami arrival time, hurricane track, and hurricane damage assessment.

- Database information including textual, map, and imagery data and other data stored in GIS data layers.

- Requests submitted to PDC for information such as public requests for emergency status information and situation updates.

- In many cases, there is limited or no remote sensing (aircraft or commercial satellite) imagery available. PDC will develop a procedure/capabilities to obtain the required remote sensing imagery through commercial sources or through coordination with other government agencies.

2.2.2.1. Data Sources

Information obtained via the above media is retrieved from various sources such as:

- Real-time Geostationary Operational Environmental Satellite (GOES) imagery
- Baseline and near-real-time RADARSAT imagery
- Baseline and near-real-time SPOT satellite imagery
- Baseline and near-real-time high resolution panchromatic and multispectral imagery
- National Weather Service textual advisories, watches, warnings, and forecasts
- Modeling results from a series of models run at the National Weather Service Forecast Office, Pacific Tsunami Warning Center, Hawaiian Volcano Observatory, or at PDC [2]
- Pacific Tsunami Warning Center regional tide gauge data and tsunami propagation time prediction
- Hawaiian Volcano Observatory volcanic eruption, lava flow, "VOG" and "LAZE" information
- GSI data pertaining to topography, population, infrastructure, and resources information
- GIS data fields relating to property value for damage assessment
- Emergency management agencies employ data unique to their operations but potentially beneficial to a larger emergency management community. An energy manager may provide proprietary data on energy grid status, estimated time of repair, and load capacity
- Data derived from national collection assets

2.2.3. Fusion

The process of fusion prepares data from various sources for display and analysis. The PDC has the capability to fuse information from many sources into a common format. Examples of fusion activities include:

[2] Current sets of model data in use include the Hawaii Fire Weather Index (run several times daily), the Tsunami Travel Time "T Watch" (run whenever a tsunami-genic epicenter sustains a moment magnitude of 6.5 or greater on the Richter Scale), and the DOD Consequences Assessment Tool Set (run by the PDC modeling analyst when required for hurricane and new models being developed to support a number of disaster scenarios, including wildfire, tsunami, and storm surge, can also be used as input to the PDC information processing cycle.

- Imagery from various sources presented in a common format
- Modeling and simulation results presented in a common format
- Database inputs consolidated and stored in a common format
- Archived information retrieved in a format ready for manipulation
- Output in graphical display format ready for further processing

To accomplish the fusion process, PDC uses an integrated architecture of commercial off-the-shelf hardware and software operating systems and applications comprising:

- Networked personal computers using Windows NT™ operating system
- Networked client/servers using the UNIX™ operating system
- Color and monochromatic high-speed printers
- Large-scale scanners and plotters
- Dynamic database programs
- Industry-standard GIS
- Industry-standard word processing and graphics packages
- Industry-standard photographic rectification and manipulation tool sets
- Web site creation software

2.2.4. Analysis

Analysis capabilities include reduction, correlation, processing, interpretation, modeling, and extrapolation of data to prepare information for inclusion in an information product. For mitigation and preparedness, analysis may identify potential adverse risk and consequences. Analysis assists in the evaluation of preparedness, training, resource allocation, and development of plans and procedures. For response and recovery, analysis enables the timely formulation of an accurate picture reflecting the status of the population, infrastructure, and resources required to prioritize and carry out remediation. Advanced tools to assist in reducing and analyzing collected data to create tailored products include:

- Automated image storage, retrieval, correlation, and formatting
- Web site search engines
- NetDynamics™ database/Internet interface
- Internet Map Server™ GIS/Internet interface
- Event-driven ESD (archiving)
- Event-driven complex predictive tools (models)
- Automated change detection in multispectral image processing

2.2.5. Production

The PDC creates customized emergency management products tailored to individual user needs. Current PDC general products include situation updates and reports and database updates in both digital and hard copy format, as required by the user. Current baseline product categories are identified in Figure 2-6 and in section 2.4. A listing of general and customized products available by June 1998 is included in Appendix B. The end users of the PDC products provide critical feedback on product content, timeliness, accuracy, usefulness, and ease of use.

To facilitate product generation, software tools used allow the PDC analyst to:

- Query and validate raw data sources
- Import modeling output data from internally or externally run models
- Import historical or baseline data for comparison
- Use word processing, spreadsheet, and graphic tools to annotate products
- Size visual products for ease of online transmission, viewing, and download
- Affix caveats or disclaimers on use of data
- Conduct predissemination quality assurance review for essential elements of information (PDC logo, source, reference date/time, effective period, agency approval, etc.)

GIS is a key tool for product generation. GIS maps or geocoded imagery can be enhanced with GIS data layers depicting topography, infrastructure, tax map parcel information, etc., and annotated with summary tables of statistics. Such products have proven useful in depicting risk and consequence assessments related to tsunami runup areas, downstream flood hazard from dam overtopping or failure, lava migration potential, orographic wind stress, drought hazards, crop failure, wildfire potential, and so forth. GIS layers assembled by agencies working with PDC during data collection activity can also be used to produce integrated emergency management products. For example, an unalterable flood potential layer provided by the National Weather Service for a geographical basin could be enhanced with select infrastructure data (such as population at risk, shelters, evacuation routes, potential bottlenecks) into a combined NWS-PDC risk and consequence assessment product that would assist emergency managers in planning a course of action and marshaling resources to address the threat.

2.2.6. Dissemination

The primary means of disseminating routine and disaster-related products from PDC is via the PDC Internet Web site. The Web site has a public page available to anyone with Internet access and a private page that is restricted, password-protected, and accessible only to authorized emergency managers via the PDC intranet wide area network (WAN). In addition to PDC products, the Web site also contains links to other sites that provide information dealing with disasters and natural phenomena. The PDC Web site provides search tools that allow emergency managers to access discreet information with their software browsers.

GIS online tools and the map server capability provide another means for disseminating PDC products via the Internet. Emergency managers can use GIS tools, such as the currently installed ArcView™ software, to view themes and layers that are organized into projects. The themes and layers can be toggled on and off, allowing the viewer to look at different combinations of data for analysis. New interactive products, for example, Java™ applets, allow emergency managers to select and monitor messages, PDC area products, and GIS-related layers.

Users from the Pacific Insular States will potentially be able to access PDC products via the Internet, NOAA's Emergency Managers Weather Information Network (EMWIN) broadcast, and the Pan-Pacific Educational and Cultural Experiments by Satellite (PEACESAT) project. Since several regional user agencies maintain facilities in the Pacific Insular States, it may eventually be possible for PDC to disseminate products via user communications backbones as a redundancy measure. The PDC can package products in a number of ways, including a broad

range of digital storage mediums or online formats, telephone facsimile, and hard copy, that support high- and low-bandwidth end users.

2.2.7. Automated Collection, Fusion, Production, and Dissemination

Automated processes allow PDC to receive data and automatically generate information products for the emergency management community. This end-to-end activity encompasses time-critical collection, fusion, production and dissemination of information without human intervention.

- NWS weather watches and NWS warnings are extracted from the weather wire and automatically disseminated to predefined emergency managers.
- PTWC tsunami bulletins are extracted from the NWS weather wire and automatically disseminated to predefined emergency managers.
- Critical information is parsed from tsunami warning bulletins used to execute a tsunami travel time program that predicts wave arrival time; results are posted on the PDC Web page.

2.3. Functional Operating Areas

To perform the specific activities required under each element of the PDC information processing cycle, PDC operations are organized into seven functional operating areas. These FOAs directly support each of the activities in the PDC information processing cycle. **Figure 2-5** depicts the PDC FOAs.

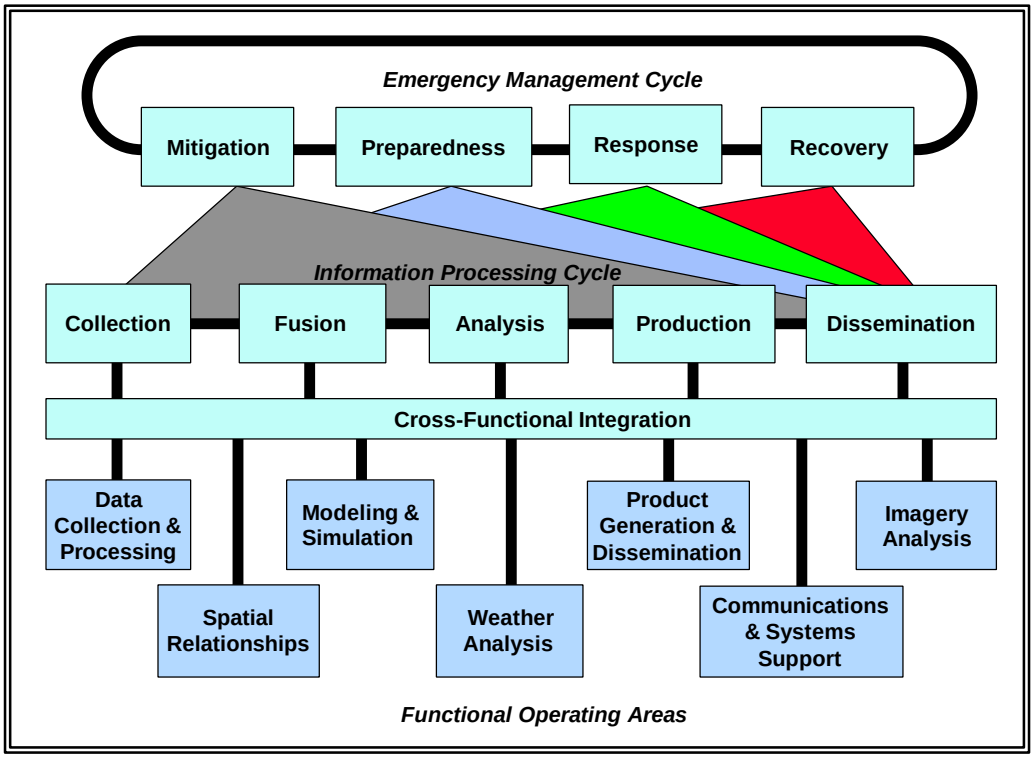

Figure 2-5: Functional Operating Areas

FOAs show how they cross-functionally support the development of information products and capabilities for emergency management. In some cases, data from a single FOA can form a product that meets a user need, for example, a listing of county shelters. In other cases, data or intermediate products from multiple FOAs must be retrieved or developed and fused to support the information processing and analysis cycle. To produce a damage assessment product, input or intermediate products and analysis are required from the imagery, geographic systems, and weather FOAs. A discussion of each FOA is contained in Appendix A.

2.4. Current PDC User Products and Capabilities

The intensive information processing and analysis cycle depicted in Figure 2-5 enables PDC to offer emergency managers a broad range of capabilities and information products. These capabilities and products are divided into a set of categories based on analytical complexity and level of information processing. **Figure 2-6** outlines these categories and product types within each level.

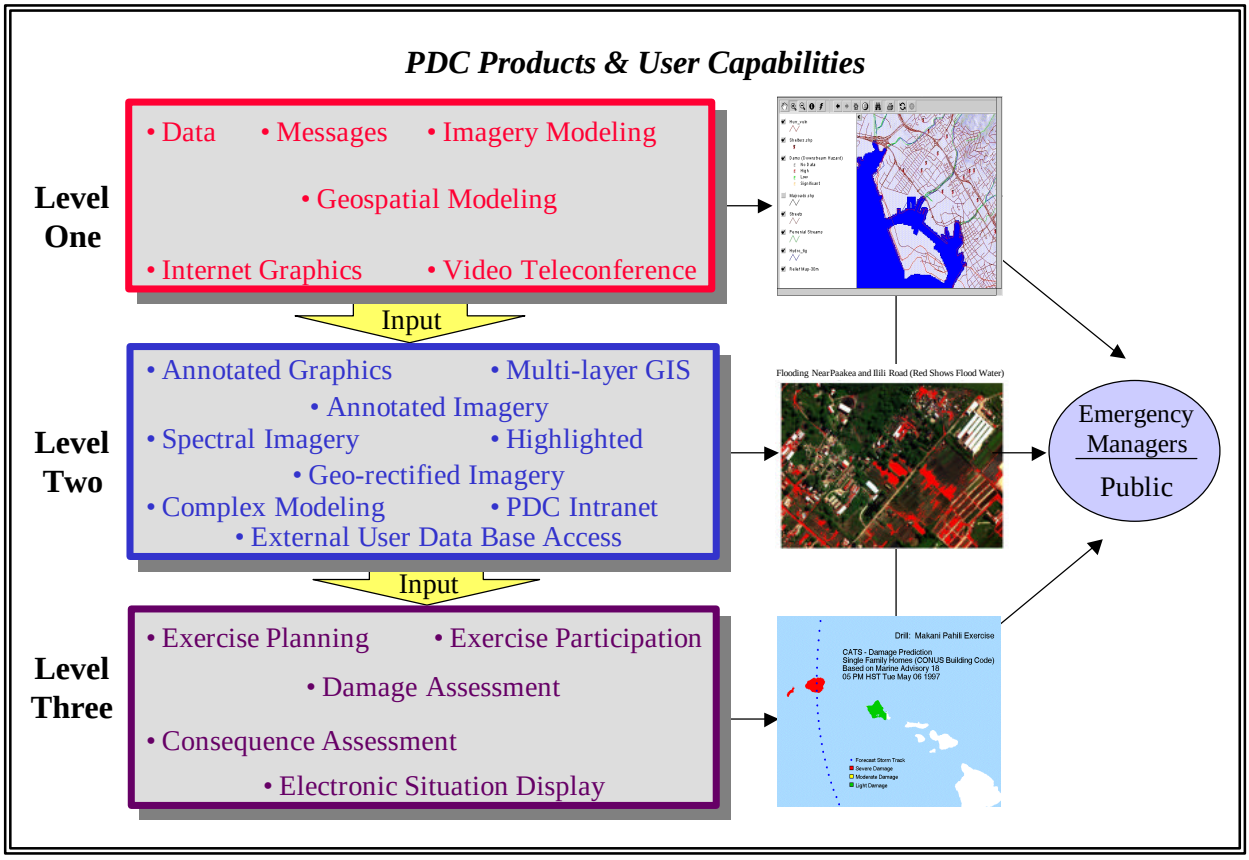

Figure 2-6: Current PDC Products and User Capabilities

The PDC Web home page directs the public to information at different levels of interest: county, state, region, and nation. Within each of these areas is information of vital interest to the public, such as disaster checklists, tsunami evacuation maps, emergency information from one of the twenty-two state departments, Pacific Insular State maps, and FEMA area studies. In addition, PDC furnishes continuous weather information for the public and emergency managers, including weather narratives, forecasts, satellite imagery, and storm tracks.

For emergency managers exclusively, routine information includes:

- Weather wire and interisland data net message traffic
- Daily tide gauge information for the Hawaiian Islands
- Emergency management and historical event information retrievable via a text search capability
- Predicted tsunami arrival time information based on PTWC tsunami bulletins and model output
- A fire weather index, color-coded to show areas of Hawaii that have a higher than normal weather-induced fire potential

In addition to this routine information, the PDC posts sample products and electronic situation display information from previous disaster events for reference by emergency managers.

As noted in section 1, the primary events covered at this time are:

- Tropical cyclone activity
- Severe storms
- Local flooding
- Tsunami
- Volcanic eruption
- Earthquake
- Wildfire
- Drought
- Certain manmade disasters

When a disaster event is imminent or has occurred, the PDC generates tailored information products for emergency managers. The tables in the next section show current products dealing with specific disaster events.

2.5. Categories of PDC Products and Capabilities

2.5.1. Description

PDC products and capabilities are divided into the following categories and levels of complexity:

- **First Level** - Products or capabilities at this level require the least amount of processing or analytical intervention; some may be partially or fully automated.

- **Second Level** - Products and capabilities at this level require significant amounts of information processing, analysis, and in some cases, creation of intermediate products as well as systems training and functional operating area knowledge. Capabilities provided may require end user training at the PDC .

- **Third Level** - Products and capabilities at this level require the greatest amount of information processing, analysis, and in most cases, creation of multiple intermediate products as well as systems training and functional operating area knowledge. Capabilities provided require end-user training.

It is important to emphasize that as the category level increases, the level of analytical involvement, information processing, and data conditioning greatly expands. Thus, level two products require data or products from level one, and level three products require data or intermediate products from level one and two. The end-user capabilities provided at each level also require increasing amounts of training.

List of Products, Types, and Capability Categories

Product Category Code	Category Name	Description	Sample Product
1A	Data	Digital or tabular information	List of year's storms
1B	Messages	Textual information	NWS advisories
1C	Graphics	Bar chart or visual representation of an area	Map of Hawaiian Islands
1D	Imagery	Processed digital, panchromatic, multispectral, or video information	Mud slides, GOES imagery
1E	Geospatial	Single-layer GIS system tabular or graphic information	Shelter sites or map
1F	Modeling/simulation	Tabular or graphic output	Tsunami arrival time
1G	Internet*	Internet access to PDC products	Public home page
1H	Video-teleconferencing*	Video-teleconferencing capability with PDC	Hurricane exercise
2A	Annotated graphics	Product that combines visual representation with explanatory textual, graphic, or tabular notations	Storm tracking map
2B	Imagery georectified	Interpreted and processed imagery that is geo-referenced	Coastal area mosaic
2C	Imagery analyzed/annotated	Interpreted and processed imagery that is annotated with explanatory textual information or graphic symbols	Flooding details
2D	Imagery classified	Interpreted and processed multispectral imagery that highlights specific spectral bands	Flooding exercise
2E	Multilayer GIS	Tabular or graphic representation of results from complex processing of multiple GIS data layers	Storm surge potential
2F	Complex modeling/simulation	Tabular or graphic representation of results from complex processing of multiple data sets through models, includes development of intermediate products	Storm damage prediction
2G	External access to PDC data	Remote access to tailored PDC databases giving user unique browse and mapping capabilities	Internet map server
2H	PDC intranet	Participation in protected wide area network that can limit access to specific user information and products	PDC intranet

List of Products, Types, and Capability Categories (Cont)

Product Category Code	Category Name	Description	Sample Product
3A	Exercise planning	PDC personnel participation in exercise planning stage including development of specific databases and products	Hurricane readiness exercise
3B	Exercise participation	PDC simulation of support required during disaster event including full spectrum of products and capabilities	Disaster preparedness exercises
3D	Consequence assessment	Tabular, textual, and/or graphic representation of results from complex processing and analysis of imagery and multiple data sets using models; includes development of multiple intermediate products to assess potential consequences of various events	Dam over-topping
3E	Electronic Situation Display	Event-driven protected access application for emergency managers that provides capability to monitor ongoing ESF status and operations with capability to exchange graphic, textual, and tabular data	Electronic Situation Display

*** Denotes capability**

The example products are representative of individual product types and not an exhaustive listing of PDC products. As PDC production will vary in relation to individual disaster events, the number of products will change. PDC plans to provide an online listing of products (catalog) that will be available to emergency managers and periodically updated.

2.5.2. List of Product Categories with Associated Products

2.5.3. Current PDC production includes the following products:

Category Code	Category Description	Product #	Product Name
1B	Messages	75	Daily Weather Situation Report
1D	Imagery	71	GOES Weather Imagery
1E	Geospatial	6	Detailed Street Maps
1F	Modeling/simulation	74	Tsunami Travel Time Map
1G	Internet*	77	Tsunami Facts
		73	Tsunami Evacuation Maps (Online)
		72	County Disaster Manuals (Online)
2A	Annotated graphics	48	Map Depicting Typhoon Tracks
2B	Imagery georectified	17	Imagery-Based Map with Overlays
2C	Imagery analyzed/annotated	2	Annotated Imagery of Damaged Areas
2E	Multilayer GIS	37	Maps Depicting Volcanic Effects
		49	Maps Depicting Detailed Weather Conditions
2H	PDC intranet	76	Daily Astronomical Tide and Current Predictions

2.6. New Products and Developmental Areas

Consultations with regional emergency managers ascertain the need to significantly expand the type and detail of current PDC products. Appendix B discusses new products and developmental activities for each FOA to meet these needs.

Section 3

PDC EMERGENCY MANAGEMENT INTERFACES

3. PDC EMERGENCY MANAGEMENT INTERFACES

The Pacific Disaster Center supports various levels of emergency management entities in the region, from local and state to federal agencies. The following section is a description of PDC's area of interest, its regional user base, and the nature of its collaboration.

3.1. The Pacific Disaster Center Area of Interest

The PDC's primary area of interest encompasses the States of Alaska and Hawaii and six members of the Pacific Caucus including American Samoa, Federated States of Micronesia, Marshall Islands, Commonwealth of the Northern Marianas, Guam, and Palau, referred to collectively as the Pacific Insular States (**Figure 3-1**).

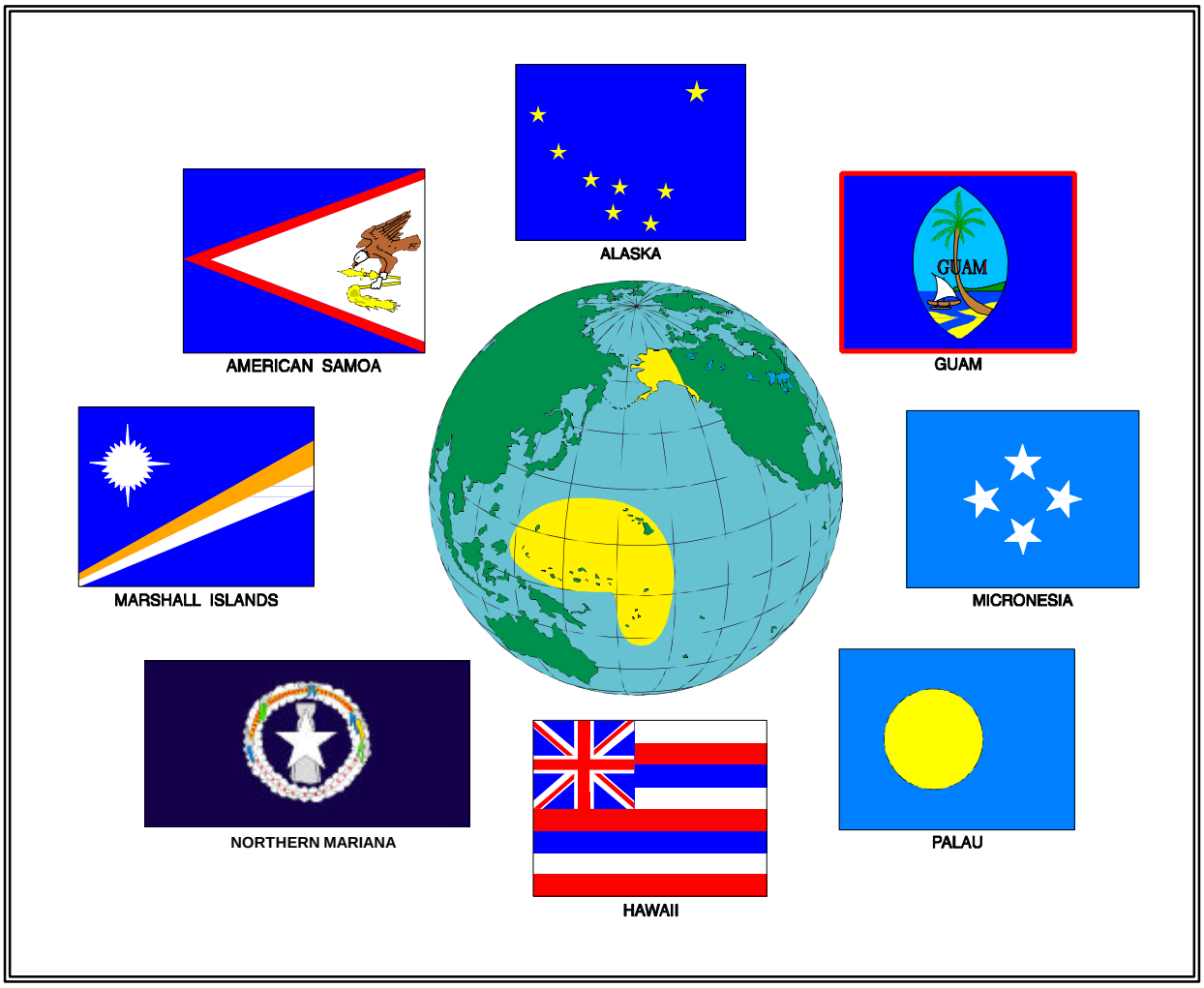

Figure 3-1: The PDC Area of Interest

3.2. Emergency Management Organizations

Throughout the Pacific Region, many federal, regional, and local organizations are involved in emergency management operations covering a wide variety of environmental and manmade disasters (**Figure 3-2**). Regardless of the nature of any specific disaster, emergency managers are constantly taking steps to minimize loss of life, reduce property damage, restore essential public services, expedite the recovery and rehabilitation of affected individuals, and ensure the continuance of normal governmental functions. In addition to their roles in times of emergency, federal agencies educate the public, operate monitoring systems, and issue alerts, watches, and warnings of potential hazards such as storms, tsunamis, fires, and radiological incidents.

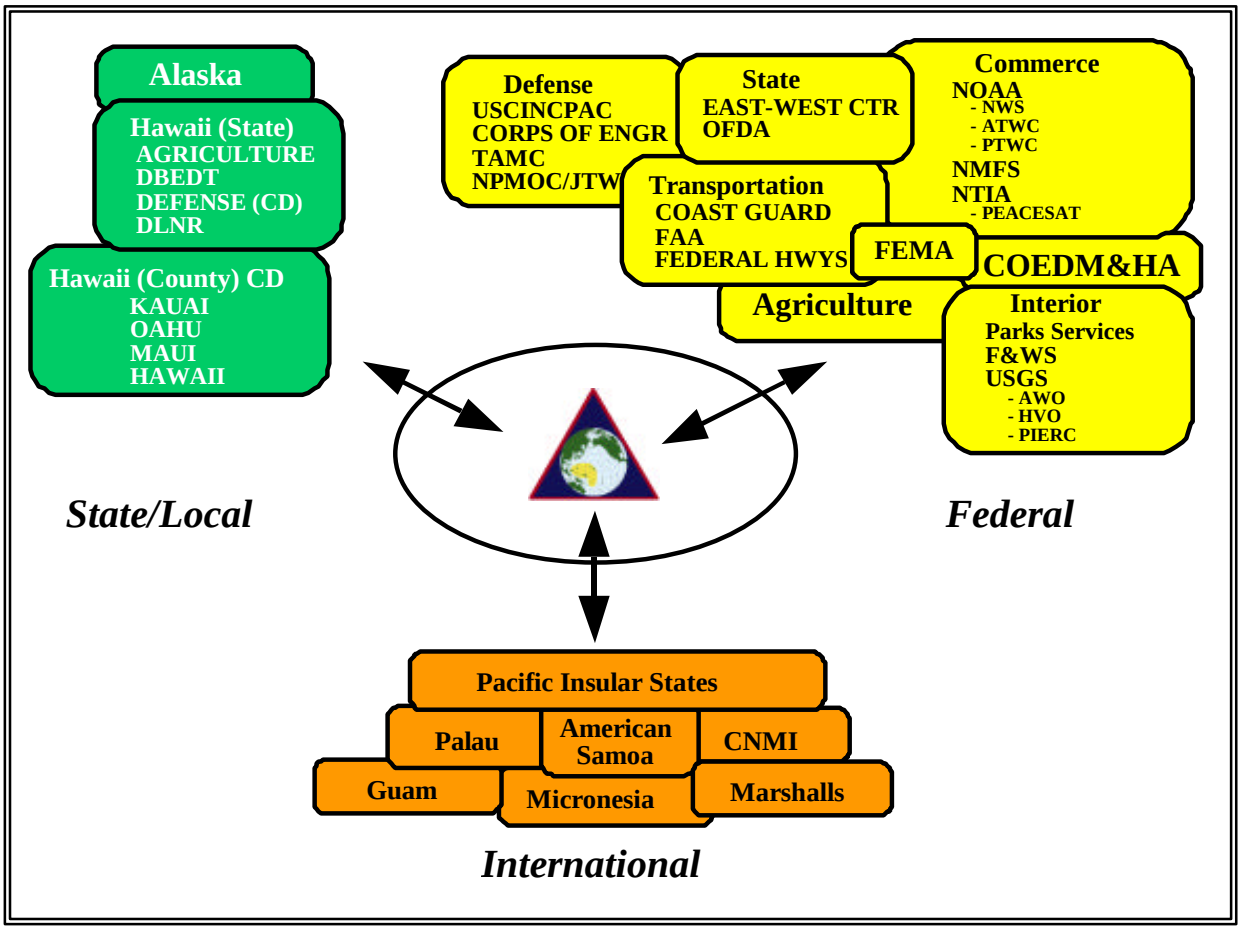

Figure 3-2: Emergency Management Organizations in the Pacific Region/Hawaii SCD

Emergency management activities and processes are spread across a wide spectrum of federal, regional, state, and local government organizations. The following list represents regional emergency management organizations with which PDC interfaces. PDC has established relationships with the organizations in boldface type. Others will likely be added as PDC gains experience and appreciation from the user community. Details on these organizations and their emergency management responsibilities are available in Appendix C.

3.2.1. Regional Federal Agencies

- ***Federal Emergency Management Agency Region IX****, Presidio, San Francisco, California, and* ***FEMA Pacific Area Operations (PAO)*** *Ft. Shafter, O'ahu, Hawaii*
- ***U.S. Department of Agriculture****,* ***Cooperative Extension Service****, College of Tropical Agriculture & Human Resources, University of Hawaii, Manoa, O'ahu, Hawaii*
- ***U.S. Department of Agriculture****,* ***Farm Service Agency****, O'ahu, Hawaii*
- ***U.S. Department of Agriculture****,* ***Forestry Service***
- *U.S. Department of Commerce, National Marine Fisheries Service, O'ahu, Hawaii*
- ***U.S. Department of Commerce****,* ***National Oceanographic and Atmospheric Administration Region 6***
- ***U.S. Department of Commerce, National Oceanographic and Atmospheric Administration Region 6, National Weather Service Forecast Office Honolulu*** *(Central Pacific Hurricane Center), O'ahu, Hawaii*
- ***U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, National Weather Service, Pacific Tsunami Warning Center****, Eva, O'ahu, Hawaii*
- ***U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, National Weather Service, West Coast/Alaska Tsunami Warning Center****, Palmer, Alaska*
- ***U.S. Department of Commerce, National Telecommunications and Information Administration****,* ***University of Hawaii PEACESAT program****, O'ahu, Hawaii*
- ***U.S. Department of Defense, Commander-in-Chief, U.S. Pacific Command****, Camp H.M. Smith, O'ahu, Hawaii*
- ***U.S. Department of Defense, U.S. Army Corps of Engineers****,* ***Pacific Ocean Division****, Honolulu, O'ahu, Hawaii*
- ***U.S. Department of Defense, Joint Typhoon Warning Center****, Guam*
- ***U.S. Department of Defense, U.S. Navy, Navy Pacific Meteorology and Oceanography Command****, Makalapa, O'ahu, Hawaii*
- ***U.S. Department of Defense, U.S. Army, Tripler Army Medical Center****, Honolulu, O'ahu, Hawaii*
- ***U.S. Department of Defense, Center of Excellence for Disaster Management and Humanitarian Assistance*** *(TAMC), O'ahu, Hawaii*
- ***U.S. Department of Energy (DoE), Pacific Area Support Office****, Hickam Air Force Base, Kamakahi Road Bldg. 3225, Honolulu. HI 96853*
- ***U.S. Department of the Interior, Fish and Wildlife Service****, O'ahu U.S.*
- ***Department of the Interior, U.S. Geological Survey, Alaska Volcano Observatory****, Anchorage, Alaska*
- ***U.S. Department of the Interior, U.S. Geological Survey Hawaiian Volcano Observatory****, Kilauea, Hawaii*
- ***U.S. Department of the Interior, U.S. Geological Survey Water Resources Division****, O'ahu, Hawaii*

- ***U.S. Department of the Interior, U.S. Geological Survey Pacific Islands Ecological Research Center****, O'ahu, Hawaii*
- ***U.S. Department of the Interior, National Parks Service, Pacific Islands Cluster****, O'ahu, Hawaii*
- ***U.S. Department of Transportation, Commander, 14th Coast Guard District,*** *Honolulu, O'ahu, Hawaii*
- ***U.S. Department of Transportation, Federal Aviation Administration****, O'ahu, Hawaii*
- ***U.S. Department of Transportation, Federal Highway Administration****, O'ahu, Hawaii*
- ***U.S. Department of State, East-West Center, University of Hawaii****, Manoa, O'ahu, Hawaii*
- *U.S. Department of State, Office of Foreign Disaster Assistance*

State Organizations

- ***State of Alaska, Department of Military and Veterans Affairs****,* ***Division of Emergency Services****, Anchorage*
- ***State of Hawaii Department of Defense/National Guard****, Fort Ruger, O'ahu*
- ***State of Hawaii Department of Defense/Civil Defense****, Diamond Head Crater, O'ahu*
- ***State of Hawaii Department of Land & Natural Resources****, O'ahu*
- ***State of Hawaii Department of Business, Economic Development and Tourism (Energy Resources and Technology Division****), O'ahu*
- ***Hawaii Hurricane Relief Fund****, O'ahu*

Local and Private Organizations

- ***County of Kauai*** *Civil Defense Agency*
- ***City and County of Honolulu*** *Civil Defense Agency*
- ***County of Maui*** *Civil Defense Agency*
- ***County of Hawaii*** *Civil Defense Agency*
- *American Red Cross*
- *Salvation Army*
- *Volunteer Organizations in Assistance to Disasters (VOAD)*
- *Civil Air Patrol*
- *Coast Guard Auxiliary*
- *Police*
- *Fire*
- *Emergency Medical Services*
- *Lifeguards*

Pacific Insular States

- *American Samoa*
- *Federated States of Micronesia*
- ***Guam, Civil Defense***
- ***Guam, Office of Planning***

- *Palau*
- *Marshall Islands*
- *Commonwealth of the Northern Marianas Islands*

3.3. Communications Infrastructure

The Pacific Disaster Center's digital communications network links together the preexisting State Civil Defense local area network (LAN) at the Birkhimer Tunnel EOC and the PDC Maui PDC LAN through a series of T-1 cables and routers. PDC is able to connect with State Civil Defense, Hawaii National Guard, 22 State of Hawaii departments, 4 Hawaii counties, and a number of regional federal agencies (NWS Forecast Office, PTWC, and HVO) are connected via this "intranet" to form a WAN. Other regional users may access PDC via the Maui High Performance Computing Center's T-3 trunk and dedicated router. The Pacific Insular States can likewise access PDC via Internet providers or the PEACESAT program located at the University of Hawaii at Manoa (**Figure 3-3**). Redundancy via alternate communications paths has proven crucial in support of several distant disasters in the Western Pacific. System survivability is enhanced by backup servers and routers and robust fiber-optic connections throughout the WAN.

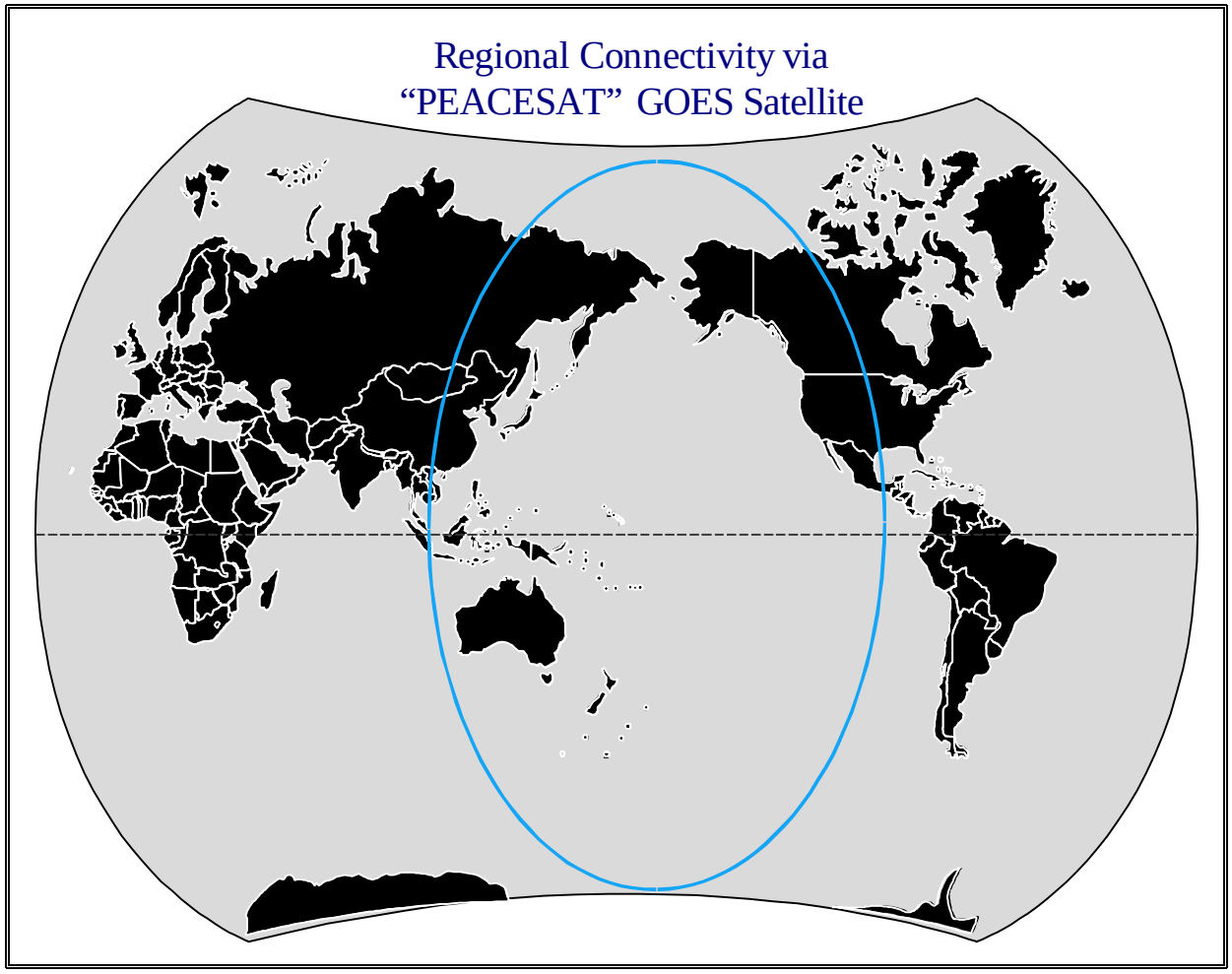

Figure 3-3: PDC Regional Connectivity via PEACESAT

Civil Defense agencies own, lease, and use the systems of other agencies for communications during the emergency management phases. These communications systems provide the means for disaster notifications and routine communications. Media include audio, video, and paper transmissions via facsimile.

PDC maintains the capability to directly inject data and product support into the Pacific Regional Emergency Management Information System (PREMIS). PREMIS is a distributed information management system and communications architecture established by State Civil Defense to provide communications connectivity among emergency response and support organizations in the region. PREMIS encompasses the emergency management organizations, the communications systems that link these organizations, and State Civil Defense automated information systems. Primary communications include commercial telephone, dedicated phone lines, high frequency (HF) and very high frequency (VHF) radio, leased broadcast circuits, and microwave systems to connect the state EOC with local- and national-level organizations. PDC's contribution to PREMIS is the ability to rapidly and simultaneously transmit detailed digital data information products featuring imagery, complex graphics, and modeling output to a large number of users. In addition, the PDC ESD allows all users to coordinate their activities by sharing situation reports.

Section 4

PDC OPERATIONS

4. PDC OPERATIONS

The staff at PDC ties together disparate data sources and provides value-added products. It does this by bringing together analytical skills, automated tools, standards, models, communications, and expertise in the specific phenomenology of the region to provide emergency managers with direct, all-hazard information support.

Processing, data, Automated Information Systems (AIS), analysis, and communications requirements are determined by the nature of the disasters and by the totality of emergency management entities in the region. The center staff members do not function as policy, response, or recovery managers; rather, they provide information products to the planners and responders in the region and on the network. PDC operations fall under two categories, normal and contingency operations.

4.1. Normal Operations

The PDC is structured to conduct ***normal operations*** on a routine basis throughout the year. Normal operations dictate that PDC continuously monitor Hawaii and the Pacific Region for disaster situations in support of each phase of emergency management activity in the PDC information processing cycle: collection, fusion, analysis, production, and dissemination. **Figure 4-1** outlines the information processing activities that occur within each phase. The PDC activity, detailed in section 2 and Appendix A, supports each of the four phases of the emergency management cycle: mitigation, preparation, response, and recovery.

4.1.1. Local/County Disasters

The primary user during a very localized disaster would be the emergency operations center of the local government exercising jurisdiction over the event. The county (Hawaii), borough (Alaska), or island group (Chuuk, Yap in Federated States of Micronesia) are typical examples. PDC's home page format permits representation and product access at the lowest EOC level. Experience dictates that resources of first responders can quickly become task-saturated or depleted. In this case, the mayor often requests assistance from the next higher element of government (state, insular government).

4.1.2. Statewide Disasters

State Civil Defense (Hawaii) and State Division of Emergency Services (Alaska) collect sufficient information early in a major disaster to advise their heads of department and governors regarding the advisability of issuing a gubernatorial disaster decree. Emergency Operating Center staffs receive situation reports from county/borough/island group first responders, and collate, and share the data with other agencies through ESD and E-mail. Activity logs archive reports received by radio and telephone from state departmental emergency managers (Civil Defense, National Guard, Department of Transportation, Department of Land and Natural

Information Processing Cycle	Emergency Management Cycle		
	Mitigation	**Preparedness**	**Response/Recovery**
COLLECTION	Collect data on infrastructure, preparedness of populace, training programs, equipment status, plans, and procedures	Obtain forecasts, alerts, watches, and warnings from various sources	Gather raw information from field teams and remote sensing
FUSION	Assess data validity and process into common frame of reference for further analysis	Assess data validity about impending disaster and process into common frame of reference for further analysis	Assess data validity and process into common frame of reference for further analysis
ANALYSIS	Prepare analyses on susceptibility of populace and infrastructure to damage; design and evaluate plans and procedures to minimize potential loss or damage	Evaluate and analyze collected data; employ models to assess potential consequences.	Analyze new data, employing existing information or databases to quantify effects of disaster on people's welfare and impact on economy; consolidate damage assessment data into usable form
PRODUCTION	Schedule equipment maintenance; upgrade educational and training materials and programs and plans and procedures	Produce announcements, tracking maps, warnings, and evaluation orders	Generate damage assessments and periodic status reports
DISSEMINATION	Distribute upgraded educational and training materials and programs; distribute updated assessments, plans and procedures	Broadcast announcements, warnings, and evacuation orders	Make assessments or reports available to federal, state, local and other responsible officials

Figure 4-1: Information Process Activities and Emergency Management Phases

Resources, Department of Business, Economic Development and Tourism, etc.) and other-agency remote teams and resources. PDC, in turn, uses these reports to produce annotated base maps to depict situation status and support the Director of State Civil Defense.

4.1.3. Regional/Federal Disasters

The Federal Emergency Management Agency functions as the entity responsible for inter-agency coordination after a Presidential disaster decree. In some cases, FEMA may dispatch initial assessment teams (IATs) to determine whether the level of damage is sufficient to warrant a Presidential disaster decree. In other cases, the damage is so widespread and severe that the need for a Presidential decree is self-evident. A federal coordinating officer (FCO) establishes an onscene command post and works with the state coordinating officer (SCO) to tie state and federal resource providers together. In addition, Disaster Field Offices (DFOs) are established in certain locations to increase accessibility to federal aid by disaster victims. PDC data collected in support of state and local emergency managers during the early response phase is useful to FEMA IATs.

4.1.4. Normal Operations During Mitigation Phase

Mitigation refers to activities that eliminate or reduce the chance of occurrence or the effects of a disaster. Recent experience has shown that while little can be done to prevent disaster producing phenomena, much can be done to reduce their impact. For example, requiring protective construction to reinforce a roof is a mitigation effort that reduces damage from the high winds of a hurricane. By identifying hazardous areas such as flood or storm surge zones, areas subject to potential mudslides, or even areas subject to amplified high winds, PDC products can be used to preclude residential or infrastructure development in these high-risk areas.

Mitigation activities include monitoring and analysis of physical changes to the environment resulting from natural and manmade events. These events include pollution, erosion, water runoff, flora and fauna shifts, volcanic activity, ocean hot spots, and coral formation growth. Regional monitoring of precipitation patterns allows emergency managers to anticipate drought conditions, wild fire hazards, and impacts upon agricultural yields.

Mitigation efforts will be enhanced by the data routinely collected and analyzed as part of PDC information processing. Warning indicators ensure attention to problem areas and provide opportunities to intensify longer term mitigation efforts within the overall program, under a disaster preparedness phase.

4.1.5. Normal Operations During Preparedness Phase

Preparedness involves planning emergency or disaster responses and assembling available resources to respond effectively. Preparedness activities are designed to save lives and minimize damage by educating people to respond appropriately to an imminent emergency. To properly respond, a jurisdiction must have a plan, trained personnel, and necessary resources.

Preparedness is enhanced by PDC information management that includes hazard identification, connectivity to sensor systems, monitoring warnings and related procedures, and communications support. Continued training using simulation and modeling exercises further facilitates learning opportunities for first responders.

4.1.6. Normal Operations During Response Phase

Response activities are designed to provide immediate assistance to victims of an emergency and to reduce the likelihood of secondary damage. The local civil defense, fire department, law enforcement department, rescue squad, public works personnel, emergency medical services, and other emergency support service personnel are first responders.

Examples where PDC information management plays a key role in response include:

- Near-real-time information monitoring 24 hours per day before, during, and after a major emergency to ensure responsive application of resources
- Availability of preevent baseline information

- Enhanced initial damage estimates
- Secondary damage reduction capability
- Destruction forecast modeling to shorten the response time for federal relief resources
- Recovery resource estimating to provide guidance for mobilizing government and private agency support efforts reacting to a disaster

4.1.7. Normal Operations During Recovery Phase

Recovery continues until all systems return to normal or near normal. Short-term recovery returns vital life-support systems to minimum operating standards. Long-term recovery from a disaster can go on for years until the entire disaster area is completely redeveloped. Recovery planning should include a review of ways to mitigate future emergencies, hence the realization of the unbroken emergency management cycle.

Recovery includes PDC providing comprehensive integrated information on the area or region affected by a disaster. By integrating local computing systems with assessments of national and regional disaster management offices, emergency managers can maintain accurate records of decisions and expenditures during the recovery phase. Recovery should also include monitoring and measuring delayed or visually unobserved changes to the environment following a disaster. These measurements and advanced modeling techniques can help restore affected areas.

4.1.8. PDC Operators and Analysts

PDC personnel conduct management, operations and training, product development, system administration, sustainment, maintenance, and system enhancements. During normal operations, the PDC staff executes a 5-day/8-hour shift at the Maui facility and the O'ahu node. The Maui facility is self-contained for analysis and information processing activities. The O'ahu node, collocated with the Hawaii State Civil Defense Emergency Operations Center, provides system redundancy for the Maui facility as well as a reliable communications hub. The O'ahu node is capable of limited production if the Maui facility is rendered inoperable. PDC staff is integrated into a single functional team for all operations, sustainment, and enhancement activity.

4.1.9. Management

The management staff, with administrative support, oversees the operations of the PDC during normal and contingency periods. The site manager is responsible for operations of the center, physical security of the facility, data and products, and system enhancement tasks at the PDC. This staff supports briefings for federal and regional emergency managers and orientations and tours.

4.1.10. Operations and Training

The staff for operations and training includes analysts skilled in multiple functional operational areas to support PDC database development, product creation, and dissemination. This staff participates in regional exercises and conducts the training of PDC surge staff for contingency operations. This staff also identifies and integrates new baseline data sources, develops new products, maintains the product inventory, develops standard operating procedures, conducts exercises, and produces daily preapproved products for distribution to emergency managers.

4.1.11. System Administration

The system administration staff provides LAN, WAN, and facility sustainment. This staff also provides application development, new product capability development, data administration, database development, and the enhancement and upgrade of the PDC system.

4.2. Contingency Operations

The current PDC staff can provide limited support to emergency conditions through ***interim contingency operations***. The level of support is limited by endurance of the existing staff and by availability and training of a support cadre. The PDC can support ***full contingency operations*** by identifying, training, and utilizing augmentees to assist the core staff in responding to emergency conditions.

Although PDC will continue to undergo system enhancements, the center will continue to respond to actual disasters and exercises. During these situations, the PDC staff can "ramp up" gradually or "surge" immediately into a 7-day/24-hour operation to provide timely, essential products dictated by operational requirements. PDC will use an interim contingency staffing profile that makes maximum use of assigned core staff, external agency representatives temporarily assigned to PDC, visiting matrix staff at PDC, and college interns. **Figure 4-2** shows the level of PDC support generally required across each emergency management phase for each disaster PDC will address. The following narratives illustrate PDC activity across the disaster spectrum.

4.2.1. Tropical Cyclone Activity (TCA)

PDC will routinely monitor TCA consisting of tropical disturbances, tropical depressions, tropical storms, hurricanes, typhoons, and super typhoons in the eastern, central, and western Pacific Ocean. These phenomena will appear as icons on routine weather products and situation displays on the PDC home page. Tropical cyclones generally move from east to west in the northern hemisphere. When TCA originates in the Central Pacific Hurricane Center's (CPHC) area of responsibility (AOR) long. 140° W. to 180° long. W., moves from (EASTPAC) into CPHC's AOR, or originates in the (WESTPAC) AOR (west of 180° W. and north of the equator), PDC will initiate a TCA event and commence the preparedness phase by creating and publishing preapproved products for the emergency management community. This phase can last from 72 to 96 hours. The preparation phase largely consists of collecting information regarding storm intensity, movement, and consequence analysis. Capabilities, such as the ESD,

and products, such as storm track maps, high surf advisories, high wind advisories, flood/inundation/storm surge advisories, orographic amplification assessments, and consequence modeling based on NWS textual information, are the norm.

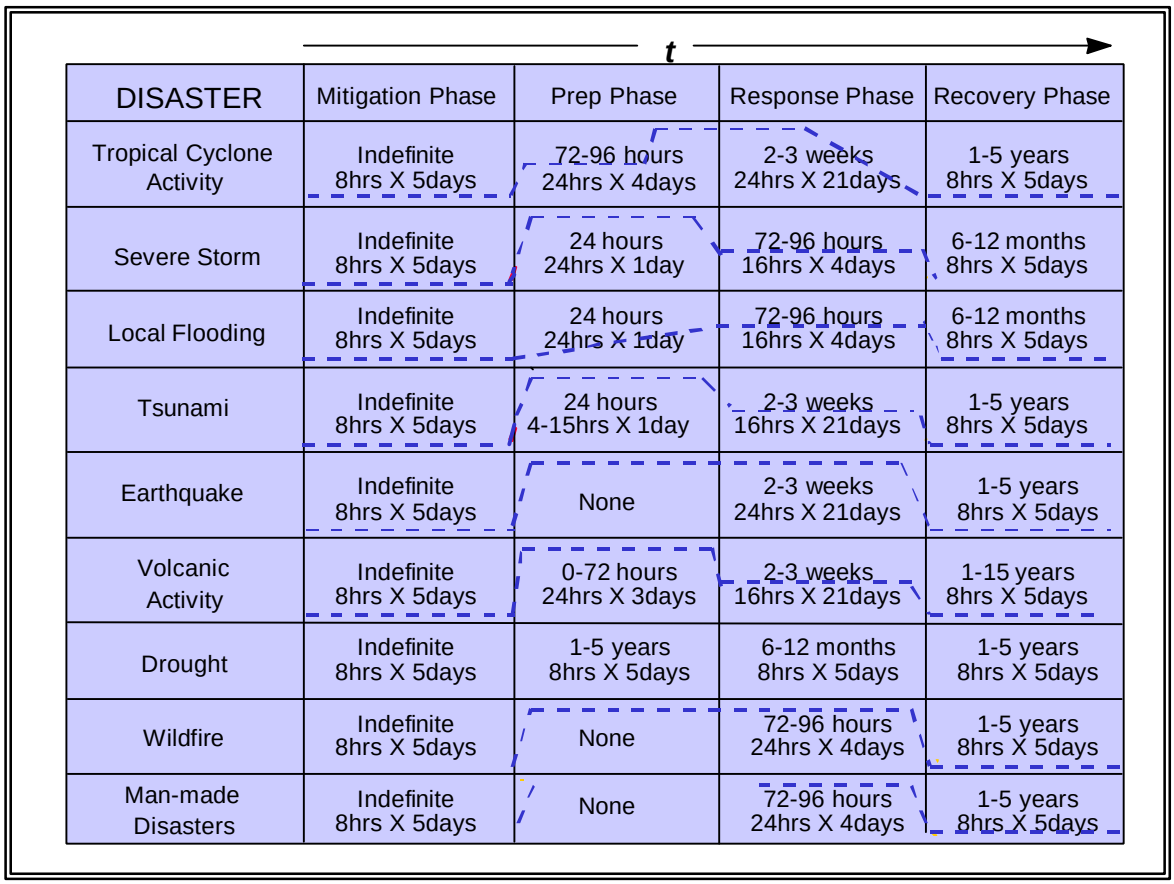

Figure 4-2: PDC Surge Requirements vs. Time

Note: The dashed line graphically represents the expected increased hours and duration of additional operational support related to an occurrence of one of these disasters.

After TCA has made landfall, PDC moves into the response phase, which might last from 2 to 3 weeks. The ESD becomes the focus of interagency coordination as resources are mobilized, initial assessments are made, and courses of action are directed by emergency managers. PDC collects status and situation reports, along with initial "weather permitting" digital, video, or RADARSAT imagery, may be processed to permit a cursory damage assessment.

Postevent imagery can be compared with preevent baseline imagery to accurately assess damage and provide emergency managers on the ground with a common and comprehensive frame of reference for detailed analysis or further notation. Such imagery products integrated with GIS map products can depict shelter and hospital loading, casualties, initial damage reports to infrastructure, and progress of relief operations. A 24-hour-per-day staffing posture will ramp down to 16 hours per day as urgency permits.

The recovery phase for TCA might last from 1 to 5 years. PDC resumes normal operations as soon as possible without delaying the delivery of annotated imagery, pre-/post-imagery comparisons, and evidence of flooding/storm surge detailed damage assessment products to requesting agencies.

4.2.2. Severe Storm Activity (SSA)

SSA, along with its related effects, is nearly identical to TCA with several exceptions. Since it is produced by a rapidly eastward-moving cold front or squall line associated with a winter storm, the intensity is generally much lower and more localized. The preparation phase may last a day or less. Weather products are similar to TCA with the exception of the storm track map, since satellite imagery usually suffices for situational awareness. High surf is the leading cause of accidental death in Hawaii. Modeling looks at the consequences of flooding and inundation. The response phase may last 72 to 96 hours. Typical effects include flash flooding and debris shifts. The population adjacent to drainage areas or located in flood plains may be temporarily evacuated. The ESD may be used to share situation reports, and GIS map products can be annotated to depict shelter and hospital loading, casualties, initial damage reports to infrastructure, and progress of relief operations. Work load and tempo of operations are foreshortened compared to TCA. PDC should be able to resume normal operations within 1 week of occurrence.

4.2.3. Local Flooding

Local flooding has earned a special significance because of its potentially lethal effect and the difficulty involved in accurate risk and consequence assessment. Flash flooding can occur at any time of the year and easily result from localized, persistent Kona type rain saturating elevated areas. Capabilities, products, work load, and tempo of operations are very similar to SSA.

4.2.4. Tsunami

The length of time available for the preparedness phase depends upon distance from the epicenter of a tsunami-genic event. For Alaska, this time may be measured in minutes. Elsewhere among PDC's user community, travel times of 4 to 18 hours are the norm. Since tsunamis occur without warning and move quickly, PDC commences a recall as soon as notification is received that a tsunami may have been generated. Work during the preparedness phase involves model corroboration, polling tide data, generating GIS risk and consequence analysis based on historical runup data, and ensuring the PTWC or WC/ATWC bulletin is available to emergency managers via the PDC home page.

The response phase can last 2 to 3 weeks, depending upon the severity of the wave, population, logistics, and infrastructure affected. Capabilities and products are similar to the TCA; work load and tempo of operations requires less than 24-hour staffing over a similar period of time. The recovery phase for affected areas is similar to TCA. Tsunami runup can produce debris loading against critical structures like bridges, especially in drainage areas.

4.2.5. Earthquake

Earthquakes can occur with little or no warning. The preparedness phase is likely to be non-existent. Damage from landslide, debris shift, fire, and liquefaction of the substratum may be extensive to infrastructure. Casualties are often very significant. A tsunami may be produced. PDC commences a recall as soon as notification is received that a significant earthquake has been generated. During the response phase, PDC collects imagery data and reports from emergency services first responders and initial assessment teams. ESD status and situation reports, along with initial "weather permitting" digital/video/RADARSAT imagery, may be processed to permit a cursory damage assessment. The weather analyst is involved in monitoring conditions which can increase the spread of fires or inhibit rescue operations. The modeling analyst runs the CATS model in anticipation of the consequences of aftershock. The imagery analyst should compile a collection plan for high-resolution visual imagery as soon as possible after the event. GIS map products can be annotated to depict shelter and hospital loading, casualties, initial damage reports to infrastructure, and progress of relief operations. Work load and tempo of operations in the response and recovery phases are very similar to the aftermath of TCA.

4.2.6. Volcanic Activity

Scientists may be able to provide some near-term warning of a potential volcanic activity event through seismic monitoring and precise measurement of an active volcano's bulge as magma moves closer to the earth's surface. During the preparation phase, the PDC weather analyst and modeling analyst assesses the risk and consequences of lava-generated fire potential and ash plume drift. The modeling analyst works with HVO or AVO geophysicists to assess lava migration potential (direction and speed). The GIS analyst plots lava field coordinates on a base map which can be used to assess risk to population and infrastructure. The response phase likely commences when either of the latter are directly threatened. Otherwise, some flows in remote areas such as Kilauea may continue without posing a threat and remain relatively unabated for 15 years. The ecosystem and infrastructure may not be recoverable.

4.2.7. Drought

Drought is a long-term phenomenon which can be seasonal or influenced by cyclical global events like El Nino. The preparedness phase can be indistinguishable from the recovery phase, which may last from 1 to 5 years. The weather analyst and modeling analyst can produce a daily fire potential graphic. Comparative rainfall data graphics can be compiled from NWS observations. The GIS analyst can display state or federal data on reservoirs. The Internet analyst can help disseminate public notices regarding restrictions on water consumption. The imagery analyst can perform multispectral or hyperspectral imagery analysis to document crop failure or livestock mortality.

4.2.8. Wildfire

Wildfire may occur with no warning, although fire potential may be assessed during a dry season or drought through observation and modeling. The response phase requires PDC to initiate recall to a 24-hour posture whenever a wildfire threatens populated areas or is burning out of control.

Rapid acquisition of thermal imagery at night and multispectral imagery during the day determine PDC's effectiveness in consequence assessment for emergency services personnel. ESD situation reports and GIS map products can be annotated to depict shelter and hospital loading, casualties, initial damage reports to infrastructure, and progress of relief and suppression operations. The wildfire capabilities, products, work load, and operations tempo are similar to that of the earthquake, except of less intensity and duration. The recovery phase can typically require many years in order to restore the ecosystem and infrastructure.

4.2.9. Certain Manmade Disasters

Disasters resulting from transportation accidents, hazardous material release, an energy crisis, or terrorist action will typically be without forewarning and may be of staggering proportions for several days. The response phase will require recall and 24-hour staffing. ESD situation reports and GIS map products can be annotated to depict shelter and hospital loading, casualties, initial damage reports to infrastructure, and progress of relief operations.

4.2.10. Interim Contingency Staffing

Figure 4-3 depicts an interim contingency strategy which reassigns personnel for limited operations generally less than 1 week in duration. This strategy will be employed until a fully trained cadre can be put in place for full contingency operations. Note that certain positions cannot be filled unless functions are duplicated, and full use is made of temporary technical onsite support for system development and enhancement.

4.3. PDC Staff - Full Contingency Operations

A fully developed contingency staffing plan for disaster operations is under development. This plan will describe the identification, recruiting, training, and sustainment of a cadre of individuals residing in the local community who will support extended operations outside normal working hours. This cadre could likely comprise military Reservists college professors, teachers, college students, phenomenologists, and high-technology experts who are mature, reliable, and geographically and economically stable. The cadre will receive explicit initial qualification training from a professional institution and gradual certification to produce approved PDC products. In this way, a modest product development team of PDC analysts will be free to handle selective ad hoc or custom requests. The contingency staff will augment the core staff approximately six times per year during scheduled exercises and receive recurrent training to maintain proficiency. **Figure 4-4** depicts a conceptual PDC full contingency staffing plan.

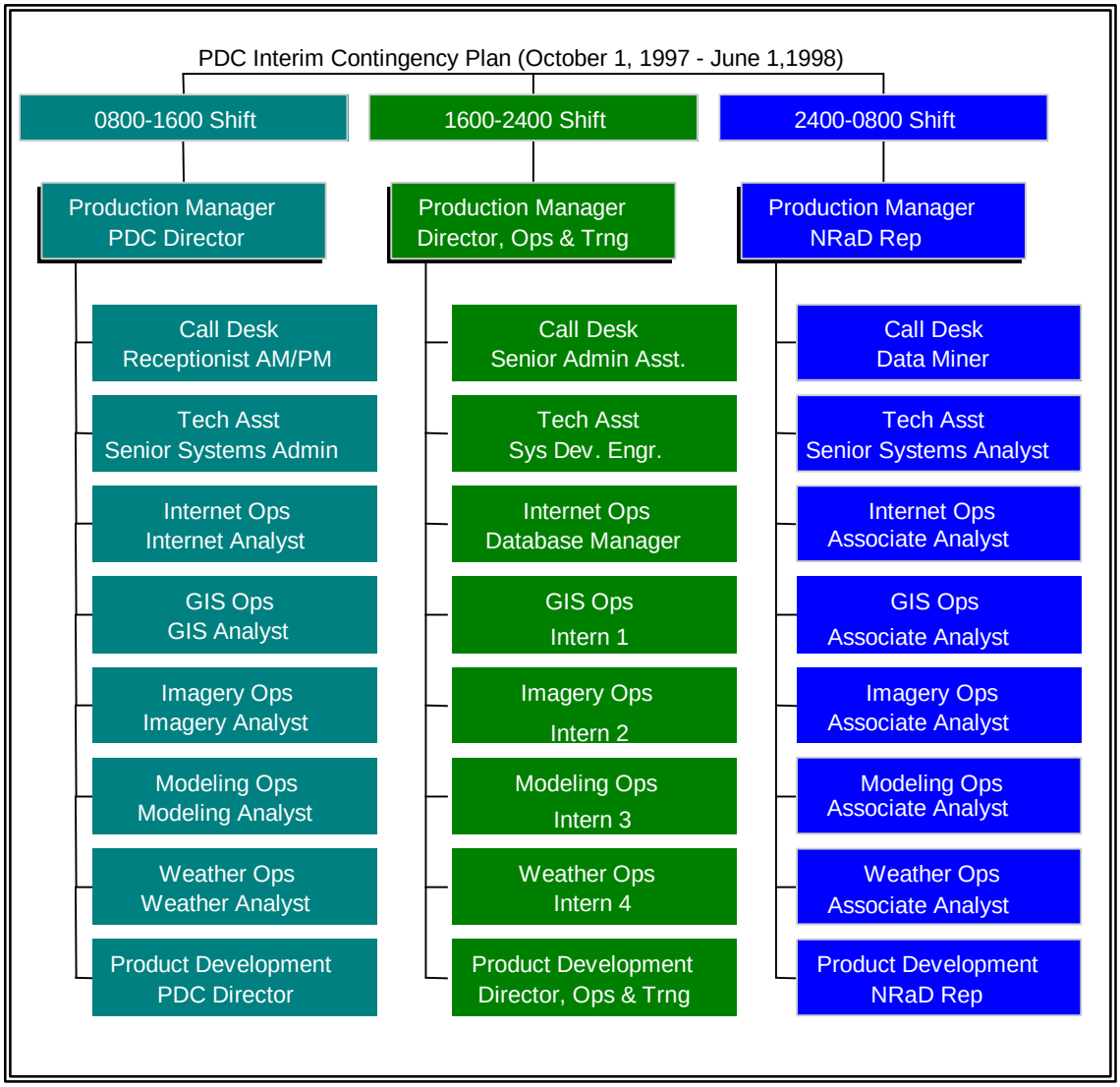

Figure 4-3: Interim Contingency Staff

4.4. Simultaneous Multiple Disasters

Depending upon the type, severity, and extent of destruction, PDC can support more than one disaster event at the same time. The ESD is event-driven and can support coordination between any group of agencies involved in a particular operation. The PDC production manager will be faced with conducting a triage assessment with regard to product priority and commonality of need. The user need database permits extrapolation of weighting factors. Products may also be characterized by complexity and time required for fusion and analysis.

4.5. Integrating PDC Operations with Regional Emergency Managers

PDC, along with its program manager, will design and implement a user feedback and support process that accounts for partnerships and unique users. This process should allow for centralized management planning and oversight and decentralized execution. Through this effort, areas for improvement and new product development, as well as measures of effectiveness, can be identified.

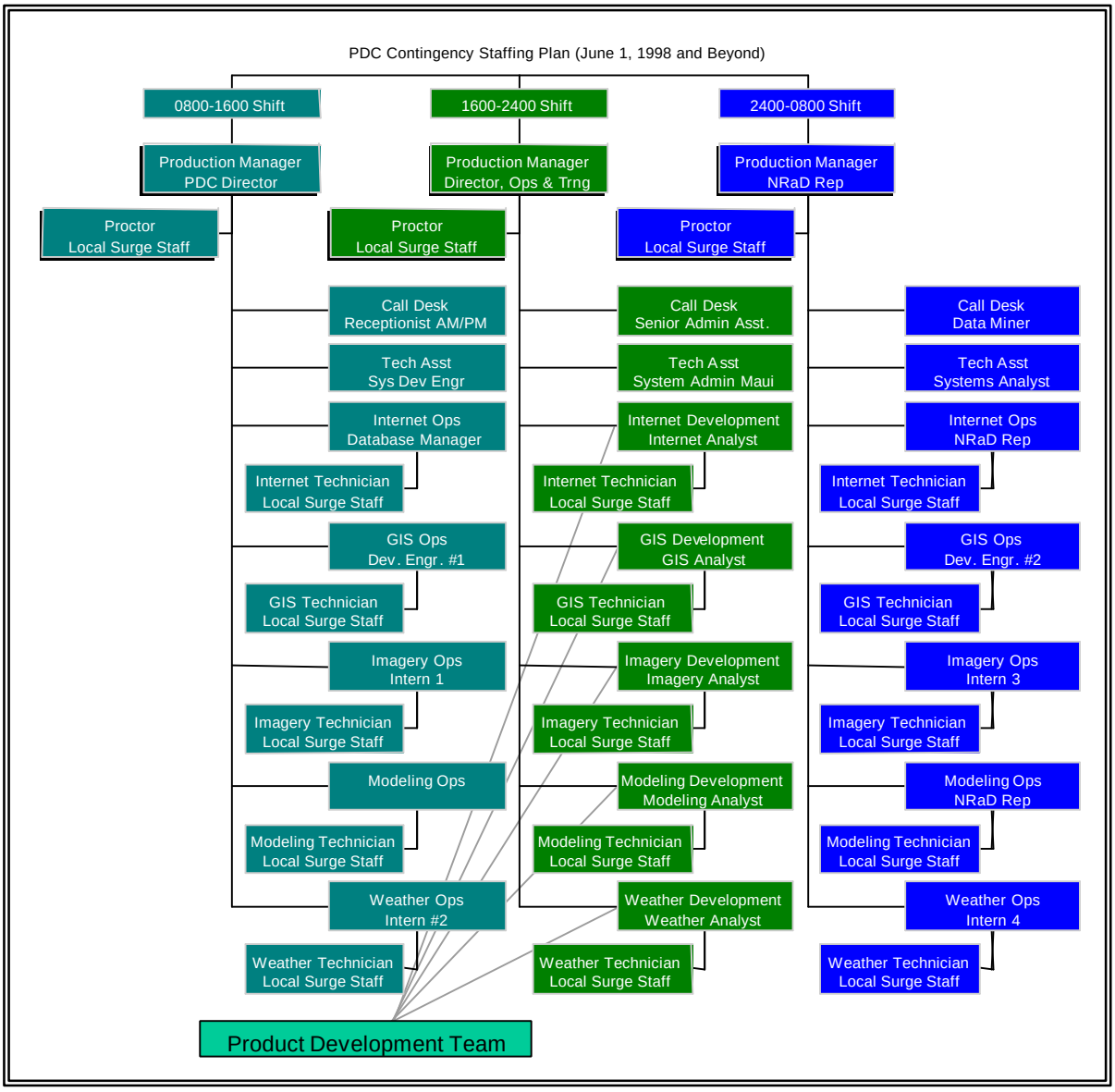

Figure 4-4: Conceptual PDC Full Contingency Staff

Appendix A

PDC FUNCTIONAL OPERATING AREAS

A.1 Weather

Activities under the weather FOA support a large portion of daily PDC product creation and support data collection, fusion, and analysis. Weather conditions are monitored daily for changes. Data (including meteorological model output) is received from the National Weather Service (NWS), including National Hurricane Center and the Central Pacific Hurricane Center, and imagery is received from the Geostationary Environmental Operational Satellite (GOES) satellite system. PDC also accesses data and imagery from the Naval Pacific Meteorological and Oceanographic Center (NPMOC), the Joint Typhoon Warning Center (JTWC), and Pacific Air Force Meteorology Office, and the Japanese GM-5 satellite. The analysts consult textual and graphical data from various Internet sources as additional aids to risk and consequence assessment.

Among many parameters, the weather analyst studies potential consequences of sea surface temperature changes, storm-generated wave height (fetch), storm surge, high surf, high wind, flash flooding, and tropical cyclone activity. PDC products generated using NWS-provided data are developed in accordance with NWS guidance and approved criteria.

A.2 Imagery

The imagery analyst supports collection, fusion, and analysis by providing a ground truth database for use in developing products during a disaster and assessing damage after.

Analysis of imagery serves several purposes. It can be used to provide emergency managers with detailed disaster area identification, damage assessments, weather, and volcano activity products. The imagery analysts use data collected from a variety of sources including aircraft, helicopters, remotely piloted vehicles, and space-based sensors. Types of imagery data available may be visible, radar, thermal infrared imagery, multispectral imagery, and hyperspectral imagery. Analysis operations include scanning, geocoding, mosaic construction, pre- and post-disaster imagery comparison, and multispectral band ratio classification techniques. PDC generates damage assessment products in several formats, including panchromatic and multispectral mosaics.

A.3 Spatial Relationships

This FOA employs analytical capability to fuse disaster information to produce multilayered PDC products. The GIS analyst uses data layers that include population distribution, topology, soils, hydrology, infrastructures, land use, land cover, and locations of disaster recovery resources. Analysis of the data in each of these layers leads to the identification of areas subject to orographic amplification, coastal inundation threat, hazardous material release, and fire descriptors. Fusion of these layers allows for the creation of potential risk and consequence assessment maps for different types of disasters. Some future dissemination may occur through interactive use of a GIS Internet map server to enable remote users to selectively display various data themes on a base map or image.

GIS FOA activity includes interaction with weather, modeling and imagery operations to produce georeferenced storm tracking maps, orographic wind stress depiction, dam overtopping, tsunami runup, and hurricane inundation maps. Upon conversion and loading of local, state, regional, and national data, the PDC GIS system provides an even more powerful tool for situational awareness, step-by-step preparation, resource allocation, and consequence assessment.

A.4 Modeling

The modeling analyst determines data collection and archiving required to provide input for model operation and subsequent validation. Fusion of model output with historical data and other predictive information yields an important analysis tool in the capability to compare and contrast results. By running various region-specific models, collecting output of these models and other remotely executed models, and subsequently validating these model results, PDC will become the facilitator of collaboration between the regional government, industry, and scientific communities. The PDC currently uses the Consequences Assessment Tool Set (CATS) to analyze the consequences of hurricane damage. Upon warning by the Pacific Tsunami Warning Center or the issuance of a seismic alert of 6.5 or greater on the Richter Scale, PDC automatically operates or runs the "T Watch" and Tsunami Travel Time (TTT) models, which allow an accurate prediction of onset of wave runup in the region. PDC imports a model, jointly developed by U.S. Forestry Service and the Scripps Oceanographic Institution, that runs an application using meso-scale data from the National Center for Environmental Prediction. This model generates a fire weather index for the Hawaiian Islands based on wind, temperature, and relative humidity several times daily. To contribute to disaster mitigation, specific types of disasters are modeled. For example, Army Corps of Engineers storm surge model results can be combined with current infrastructure maps to determine which coastal areas in the region may be at risk.

A.5 Internet Product Generation and Dissemination

The Internet plays a central role in the generation and dissemination of PDC products. Most PDC products are electronically disseminated via the Internet. The Internet also plays a key role in the open-source collection of imagery and other data from national and regional centers specializing in various applications.

The Internet analyst designs and maintains a complex home page of services for both emergency managers and the general public. Each of the phenomena monitored by the PDC is detailed on this dissemination medium: weather, tide, emergency checklists, and evacuation instructions are published; and maps and detailed instructions are maintained. Emergency managers visit their private, password-protected sites on the PDC home page to download requested products in a timely, single operation. The home page undergoes continual maintenance as PDC analysts strive for optimal service.

A.6 Data Collection and Processing

The heart of the PDC system is the ability to rapidly collect, archive, format, merge, protect and selectively access sensitive data. This function is performed by the database administrator using several sophisticated tool sets operating across an elaborate, firewall-protected database

architecture. Certain database applications are capable of remote, online access and manipulation.

A.7 Communications and System Support

System administrators are responsible for conducting routine tests and maintenance of LAN/WAN components, including remote sites, to ensure sustained operations under peak periods of heavy use. The system is designed to be robust, redundant, secure, and survivable. Communications support from WAN to end users employs hard-wire fiber-optic cable, Ethernet routers, microwave relay, satellite relay, and the Internet.

Appendix B

PDC PLANNED PRODUCTION AND USER CAPABILITIES

B.1 Developmental Areas

The section discusses developmental activities and new products to be implemented with an initial assessment of the disaster situations during which they would be beneficial.

B.1.1 Modeling:

- High-resolution modeling capabilities for hurricane track and intensity forecasts parallelized version of FSU Global Spectral Model and new, nested high resolution (25 km) Regional Spectral Model (tropical cyclone activity)

- Army "Air Sim" low-level wind model run in recent fire behavior demo (Severe Storm, Wildfire, Flooding)

- Prototype Emergency Geographical Analysis and Support System (PEGASUS) project; USFS/Scripps; Los Alamos version of RAMS (parallelized); less than 1km resolution (wildfire, drough)

- NCEP non-hydrostatic RSM coupled to Regional Atmospheric Model (RAM) for computational resolution of 1-2 km (severe storms [tornadoes, waterspouts, heavy rains, electrification, microbursts])

- Explore hydrology/inundation models for possible application in Pacific Insular States/Hawaii (tsunami, flood, severe storm, tropical cyclone activity)

- Improved “FEMA” version of DoD CATS model validated for Hurricane Iniki (tropical cyclone activity)

- Model output from NWS: (1) AVN twice daily, (2) MRF once daily, and (3) RSM twice daily @ 10-km resolution (tropical cyclone, severe storm, flooding, drought); also, regional data for Guam and specialized fields such as open ocean waves and SST; AMBER output; HYDRONET output

B.1.2 Internet:

- Revised home page: firewalled protection; double-password-protected site for registered users; one-stop shopping to download prerequested product sets; user-requested products suited to hardware/software capabilities

- Pacific Basin Threat Map for use as situational awareness tool (tropical cyclone, tsunami, earthquake, volcano, drought, wildfire)

- Improved connectivity, redundant communications paths to Pacific Insular States; opportunity to use NOAA EMWIN network to pass PDC products in EMWIN data stream (tropical cyclone, severe storm, tsunami, earthquake, volcano)

B.1.3 GIS:

- AMBER NWS GIS product to potentially couple with hydrostatic models for consequence prediction/resource allocation of multiple flash flooding scenarios (severe storm, flooding)

- Tsunami historical runup data: plot five sets of historical runup data for tsunami phenomena since 1946; collaborate with modeling analysis and phenomenologists to normalize data with current shoreline bathymetry and coastal characteristics

- FEMA inundation data for American Samoa and other PIS: create digital base maps with infrastructure themes for selected areas based upon vulnerability/population density

- Digital terrain elevation models at 5 m or less for mapping lava flows or geo-rectifying/overlaying imagery (Volcano)

- GIS product sets across all phenomena/all phases for Pacific Insular States to same degree as Hawaii

- Automated GIS hurricane track map (tropical cyclone)

B.1.4 Imagery:

- Georectified 1-ft resolution color data sets for region (no less than 3 years old) resulting in excellent ground truth imagery to provide pre-/post-comparisons for damage assessment (tropical cyclone, severe storm, tsunami, flood, earthquake, volcano, drought, wildfire)

- Region-wide RADARSAT baseline imagery in fine 8.7-m resolution mode for all-weather comparisons of postdisaster imagery for damage assessment (tropical cyclone activity, tsunami, flood)

- All-weather automated change detection by RADARSAT (all phenomena)

- Preprocessed region-wide GCPs to speed georectification (all phenomena)

- State-wide and region-wide Geo-SPOT multispectral imagery to detect vegetation health, abundance, and type (drought, wildfire, tsunami runup, max extent of flood analysis)

B.1.5 Weather:

- NEXRAD WS88D Doppler radar output (severe storm, flooding, tropical cyclone)
- High resolution data covering the Hawaiian Islands (tropical cyclone, severe storm, flooding, drought)
- Automated hurricane track map (tropical cyclone)
- Detailed flood assessment products (matched to AMBER data and GIS layers of infrastructure) (severe storm , tropical cyclone, flooding tsunami)
- Detailed orographic assessment/wind stress products (based on AIR SIM/RSM running over local terrain) (severe storm, tropical cyclone)
- Input from array of remote sensors on Mount Haleakala tied to RSM for temporal spotcasting validation opportunity for RSM (severe storm)
- Automated validation of modeling output through confirmation with observable parameters (tropical cyclone, severe storm, flooding, drought)

B.2 Current and New Products

The following list outlines PDC products expected at ESC:

Prod	Name	Description	Cat
1	10 Meter Spatial/1 Meter Vertical Resolution DEMs for Region	Digital topographic data of Hawaii and Pacific Insular States with 10 meter spatial resolution or better & 1 meter vertical accuracy, based on a common horizontal reference. For Hawaii, request data projected to UTM Zone 4. For Pacific Insular States - Geographic Coordinates.	1E
2	Annotated Imagery of Damaged Areas	Graphic products rapidly derived from post-event imagery or pre-/post-imagery comparisons which pinpoint areas of damage with icons or notes that could be used in planning response activities, in requests for assistance, and in rapid gross damage assessments. Graphics must have end-user friendly aspects that allow easy interpretation by emergency managers who are not photo interpreters. It will often show the extent, locations, type, and severity of damage resulting from tsunamis, tropical cyclones, severe storms, eruptions, fires, hazmat spills, and local flooding.	2C
3	Annotated Tropical Storm Track Map	Derived from NWS advisories: Storm Tracking Map depicting storm status, storm tracking direction, wind speed and direction, and distance radii, with previous advisory locations and time.	2A
4	Baseline Imagery	This is the PDC's most up-to-date preevent imagery coverage data which would be used as the standard against which postevent imagery is compared in order to note changes and damage. This imagery is projected to be made up of a variety of imagery types as appropriate, i.e., the highest spatial resolution imagery of densely populated areas but for rural areas lower spatial resolution with higher spectral resolution may be appropriate. This imagery should be updated every 3 years in most geographical areas but sooner in high construction areas. Important uses include identifying pre-existing damage and validating post-disaster claims. Multispectral imagery could help characterize normal vegetation types and conditions.	1D

Prod	Name	Description	Cat
5	Coastal Bathymetry Data	High-resolution coastal bathymetry data: one-foot contour data for near shore areas and information on bottom type such as sand, sea grass, etc.	1E
6	Detailed Street Maps	Maps are used to pinpoint locations of disaster-related incidents and to assist disaster responders.	1E
7	Drought Vegetation Classification Map	Map depicting drought severity (vegetation health) based on Normalized Difference Vegetation Index (NDVI) and Vegetation Greenness analysis of multi-spectral imagery. Color-coded polygons derived from the imagery would be used to depict drought severity on a map or image backdrop.	2D
8	Drought Severity Index Map	Map utilizing color-coded polygons to depict drought severity based on precipitation, temperature, fuel moisture and soil moisture contents, and stream flow, lake and reservoir levels. Similar to the Palmer Drought Index, but incorporates hydrology features (stream flow, lake and reservoir levels).	2D
9	Drought Status Report for Each County	This written report/including graphical map, would include analysis of a variety of sources such as rain gauge data, imagery, and water delivery reports to give a comprehensive drought status report for each effected county.	
10	Eruptions Image Animation Playback	This includes the animated playback of digital camera imagery of volcanic events recorded by HVO's static remotely operated ground-based cameras.	2C
11	Fire Risk Map	A map using color-coded polygons to depict fire risk levels based on wind speed, direction, temperature, relative humidity, terrain, fuel types, moisture contents and abundance. This product enable fire manager's to take action to position their fire-fighting resources during the pre-suppression phase of the fire disaster cycle.	3D
12	Map Depicting HAZMAT Type and Location of Material	Near-real-time access to information on storage locations of hazardous materials and the kinds of hazardous materials stored. Candidate for online remote access via ArcView IMS.	2D
14	GIS Products and Data Layers	Provide GIS data and products to NWS, as requested. NWS has a need for GIS data layers to enhance weather products.	2G
15	GOES image Animation Playback of Tropical Cyclones	There are at least two web-sites currently available on the Internet for viewing Tropical Cyclones in-motion for the Eastern and Central Pacific. These sites are linked from the PDC home page.	1D
16	GOES Imagery (Tropical Storm Satellite Imagery)	On-line GOES visible and IR imagery of tropical cyclone activity every 15 minutes.	1D
17	Imagery-Based Map with Overlays	An imagery and GIS fused product which includes a geocoded image with derived information displayed as an overlay and may include other appropriate GIS data layers. It is also used as an intermediate product from which to formulate and calculate rapid and detailed damage assessment tabular information. (Geo-coded imagery forms the spatial context for computing detailed damage assessments to infrastructure, population, and business.)	2B
18	List of Aviation Support Facilities in AOR	Listing of all airports, airfields, and heliports throughout PACOM AOR with detailed characteristics.	1A
20	List of Medical Resources in AOR	Listing of hospitals, other health care facilities, ambulance, and air evacuation facilities throughout PACOM AOR.	1A
21	List of Port Facilities in AOR	Listing of all port facilities and related infrastructure throughout PACOM AOR with detailed characteristics.	1A
23	List of Shelters and Collection Points	Location of designated emergency shelters and collection points within PACOM AOR.	1A

Prod	Name	Description	Cat
24	List of Special Medical Resources in AOR	Listing of special medical capabilities (hyperbaric chambers, burn centers, level I and II trauma centers, tropical disease centers, chem-bio treatment centers, etc.) within PACOM AOR.	1A
25	List of Utilities/ Distribution Nets in AOR	Listing of all major utilities and distribution networks throughout PACOM AOR with detailed characteristics.	1A
26	Listing of NGOs and PVOs in AOR	Listing of all Non Governmental Organizations (NGOs) and Private Volunteer Organizations (PVOs) throughout PACOM AOR with detailed characteristics.	1A
27	Map Depicting Downstream Exposure of Dams	Map utilizing polygons and tables from model output to depict the areas threatened by a dam break or over topping. This map may include data layers to display the location of residences, businesses, and structures, as well as economic impact and insurance considerations.	3D
28	Map Depicting Evacuation Routes, Shelter Plans, and Locations	Map showing shelter capacities, and locations down to street level detail. Inset map depicting evacuation routes to the emergency shelters from major thoroughfares.	2E
29	Map Depicting Evacuation Zones and Infrastructure	Maps and charts with special purpose overlays and themes (infrastructure, flood plains, inundation areas, etc.) throughout AOR. Map of tsunami and hurricane evacuation zones. Map should include supporting information such as locations of schools, businesses, names of major roads, etc.	2F
31	Map Depicting Flash Flood Risk Areas with Tabular Results	Map utilizing polygons and tables from model output to depict flash flood risk areas. This map may include data layers to display the location of residences, businesses, and structures, as well as economic impact and insurance considerations.	3D
32	Map Depicting Flood Risk w/Structural/ Parcel Values & Tables	Need data analysis for 100- 250- and 500-year flood events, and perform a spatial and tabular risk assessment for structures and parcels within flood risk areas.	3D
33	Map Depicting Fuel Storage Locations with Attributes Table	Map of locations of fuel storage sites, such as service stations. Attribute data to include address, fuel types, storage capacities, names of owners for the State of Hawaii.	2E
34	Map Depicting Highest Threat from Coastal Inundation	Map, derived form model output, depicting highest potential threat from coastal inundation during any given approach of a storm, with vector overlays of impacted geographic features.	2F
35	Map Depicting Hurricane Vulnerability/ Storm Surge Consequences	Map derived from spatial data analysis delineating hurricane hazard and vulnerability areas, with vector overlays of impacted geographic features.	3D
36	Map Depicting Large Scale Features	Maps for Pacific Insular States such as roads, hydrography, and other physical features derived at a large scale (e.g., <= 1:24,000).	2E
37	Maps Depicting Volcanic Effects	Large-scale lava flow field maps when required by HVO. Also maps depicting laze, vog, and lava-induced fires for Hawaii County EOC. These maps may include data layers to display the location of residences, businesses, and structures, as well as economic impact and insurance considerations.	2E
38	Map Depicting Orographic Amplification Threat Areas	Map with color-coded polygons identifying areas of the highest potential threat from orographic amplification (wind acceleration over island terrain such as valleys, ridges, cliffs, urban and rural) based on wind field, downslope effects, and topography.	2F

Prod	Name	Description	Cat
39	Map Depicting Population and Industrial Centers	Maintain pre-disaster GIS layers of major population and industrial areas throughout the AOR for planning phase. Layers depict polygons of urban and industrial boundaries, and all pertinent attributes.	2E
40	Map Depicting Rain Gauge Data (Automated)	KCDA would like online access to near-real-time rain gauge data for the county displayed as a table or map. Once automated, downloaded rain gauge data enters GIS, and a map will be produced displaying the nine rain gauges data, and if required and feasible, isohyet contours will be generated.	
42	Map Depicting Spill Location/ Extent and Tabular Results	Map using polygons and tables, derived from external modeling results, to identify the extent, locations and estimated trajectory of ocean hazard materials spills. Need access to ocean toxic chemical spill modeling results data.	3D
43	Map Depicting Storm Generated Surf Levels	Map and tables derived from external data and model output depicting storm-generated surf levels and other surf-related information by localities.	
44	Map Depicting Threat Areas	GIS map products for the P.I. States that would include base maps and overlays of infrastructure, disease vectors, and natural phenomena threats.	2E
45	Map Depicting Tsunami Arrival Time	Map utilizing contour lines to depict the arrival time of tsunami for earthquake occurring within the pacific basin. PDC procured model that calculates and displays tsunami travel time. The model consist of two components Tsunami Travel Time (TTT), which calculates estimated tsunami travel times from an epicenter to all points on a bathymetry, and TWATCH, a visualization program which animates the TTT output.	
46	Map Depicting Tsunami Inundation Zones	Map derived from external data and model output depicting Tsunami Inundation Zones. Zone delineation will depend on dynamic information on tsunami runups for different wave heights, and bathymetry data.	
47	Map Depicting Tsunami Run-up Height by Location	Map and tables derived from external data and model output depicting predicted wave height by localities, and other tsunami-related information.	
48	Map Depicting Typhoon Tracks	Maps of tropical cyclones in the West Pacific show current, historical, and forecast position. These maps are available on the PDC Web page.	1B
49	Maps Depicting Detailed Weather Conditions	Map derived from external data depicting detailed visual information on severe or inclement weather in the Hawaiian area. Graphical map showing weather problem areas.	2E
50	Maps Depicting Locations of Emergency Services	Map and tables derived from external data depicting locations of emergency services such as police stations, fire stations, ambulance and air evacuation services. On-line remotes access via ArcView IMS.	2E
52	Near Real Time Tabular Rain Gauge Data	Data obtained from NWS showing rain gauge locations, with associated totals.	1A
53	Notification of PDC Surge vs. Normal Operations	Provide a situation alert to the Disaster Information Anchor Desk (DIAD) at PACOM when the PDC goes to a higher level of watch status such as when it is in a surge mode vs. normal operations mode.	1B
54	On-Line AOR Disaster Response Library	On-line library of disaster response capabilities of each country in the AOR.	
55	On-line Catalog of GIS Maps, Charts, and Overlays	'On-line catalog' of GIS products available throughout the AOR. Capability exists via EMOPS section of Web page. Product meta-data may be generated using the spatial query features of DIAAS. (ERIM)	1G

Prod	Name	Description	Cat
57	Post-Event Imagery	Imagery data collected soon after a disaster event with sufficient spatial and/or spectral resolution to allow the identification of damage to residences, businesses, utilities, the environment, and general infrastructure. This imagery may or may not be geo-coded, but would allow comparison with baseline imagery in order to identify new damage. Emergency managers could also use it to help guide cleanup/response operations.	1D
58	Risk and Consequence Assessments	Maps and tables utilizing color-coded polygons identifying areas threatened and risk areas from flooding, fires, severe weather activity, volcanic activity, hazmat spills, and tsunamis. These maps may include data layers to display the location of residences, businesses, and structures, as well as economic impact and insurance considerations.	3D
59	Roster of Regional EOCs	Listing of all regional, state, territorial, EOCs throughout PACOM AOR with detailed characteristics.	1A
61	Summary of Infrastructure Loss	A tabular summary product from GIS with the postevent data supplied by postevent imagery. It will quantify damage by characterizing the extent of damages to buildings and infrastructure by slight/moderate/devastated or by percent damaged. This product could help verify damage for reimbursement claims.	3C
62	Tables of Property Values	Damage assessment identifying percentage or extent of damages to buildings and property derived from imagery and estimated or calculated damages from TMK data on GIS. Note: for the State and PIS if available.	3C
63	Special Update of Reports and Forecasts (SURF)	Daily message providing detailed weather information to support emergency managers and support personnel with situational awareness.	1B
64	Provide Central Data Repository for Damage Survey Reports	This is a centralized database of Damage Survey Reports in order to reduce duplication of effort and to ensure that the State EOC, county EOCs, FEMA and DOD fiscal are all working with the same information.	
65	On-line Access to Historical Tide Gauge Data.	Need to archive historical tide gauge data, which are available in hard copy at the UH, and make it accessible online. Historical tide gauge data is used in conjunction with tsunami information to develop tsunami prediction models. On-line access to the historical data would enhance the State's Tsunami Advisor's ability to assist the State EOC during tsunami watches.	
66	Automated Threat Situation Map of Pacific Region	An electronic situation map of the Pacific region displaying multiple threats in a graphic presentation. Display an alarm if any threat exceeds a predetermined threshold. It is a dynamic, real-time map depicting current weather, geologic activity, and sea state information merged with satellite imagery and remote sensing data from a variety of sources would enhance the SCD's all-hazards emergency management capabilities.	
67	End-User Risk and Consequences Modeling	The EM should be able to pose a situation and look at the consequences as quickly as possible, without requesting a product and/or without human intervention. This capability should be at the EM's disposal to perform a 'what-if' at his PC. Emergency managers need to explore various options, during planning as well as during an event. Modeling. End-user access will be limited to consequences assessment models whose outputs do not require interpretation by specialists or experts.	
68	Full Automation of Tsunami Propagation and Run-Up	Beginning with the PTWC Tsunami bulletin, SCD would like to know as soon as possible, if there is a tsunami, how big it is, and when it will arrive. This would have to done at any time, 24 hours a day, 7 days a week. The state wants to eliminate all false alarms, as well as react ASAP when a tsunami is approaching.	
69	On-line Completion of Forms and Checklists	Action officers need to call up and complete EOC checklists and forms online. Included are Initial Response Checklist, EOC Activation Checklist, EOC Deactivation Checklist, Disaster-specific Checklists, Threatening Phone Call Form, etc. Currently, there is a paper master copy of all checklists and forms at the dais. Action officers have to make a copy of a checklist or form before they can fill it out.	

Prod	Name	Description	Cat
70	Real-time Remote End-Use Access to Static and Dynamic Spatial Data.	Remote end-users may enable their Web sites with maps and interactive mapping applications. This will dramatically increase the capabilities of end-users to view tactical and strategic geographic data and related real-time information, stored in a wide variety of data formats.	2G
71	Goes Weather Imagery	GOES-9 visible and infrared imagery of the PDC region posted to the Web or made otherwise available every hour. This product may be available as often as every 15 minutes if needed in tropical cyclone situations.	1D
72	County Disaster Manuals (On-Line)	Web version of disaster and civil defense manuals for public access via the PDC Web page.	1G
73	Tsunami Evacuation Maps (On-line)	Maps of all Hawaiian Counties showing coastal evacuation zones to observe during Tsunami watches/warnings available via the PDC Web.	1G
74	Tsunami Travel Time Map	T-watch and Tsunami Travel Time (TTT) calculates and creates a map depicting the estimated travel time of a tsunami resulting from an earthquake occurring within Pacific basin.	1F
75	Daily Weather Situation Report	An overview of the current weather situation using wind, precipitation, and temperatures as the primary focus. High surf would be included when occurring.	1B
76	Daily Astronomical Tide and Current Predictions	Depicts daily astronomical tidal and ocean current variations in graphical representation.	2H
77	Tsunami Facts	Online guide to history and facts of tsunamis and related terminology.	1G

Appendix C

REGIONAL EMERGENCY MANAGEMENT ORGANIZATIONS

Federal Emergency Management Agency (FEMA) Region IX

FEMA is the central point of contact within the federal government for coordinating a wide range of emergency management activities from other federal agencies including response and recovery from disasters through implementation of the Federal Response Plan. FEMA provides funds for the development of comprehensive local mitigation programs, response plans, population protection planning, staff training, and communication systems. Pacific Area Operations (PAO) are under FEMA Region IX, headquartered at the Presidio, San Francisco, California.

The role of federal agencies in disaster management is defined in the Federal Response Plan. This plan establishes a basis for providing federal assistance to a state and its affected local governments impacted by a catastrophic event, significant disaster, or emergency that results in federal response assistance. Federal responses are grouped into twelve Emergency Support Functions (ESFs). The activities in each function are headed by a primary agency as shown in **Figure C-1** below:

ESF	Support Function	Primary Agency
1	*Transportation*	*Department of Transportation*
2	*Communications*	*National Communications System*
3	*Public Works and Engineering*	*U.S. Army Corps of Engineers, Department of Defense*
4	*Firefighting*	*U.S. Forest Service, Department of Agriculture*
5	*Information and Planning*	*Federal Emergency Management Agency*
6	*Mass Care*	*American Red Cross*
7	*Resource Support*	*General Services Administration*
8	*Health and Medical Services*	*Department of Health and Human services*
9	*Urban Search and Rescue*	*Department of Defense*
10	*Hazardous Materials*	*Environmental Protection Agency*
11	*Food*	*Food and Nutrition Service, Department of Agriculture*
12	*Energy*	*Department of Energy*

Figure C-1: Emergency Support Functions

FEMA operates the National Warning Center (NWC), which is located at Cheyenne Mountain Air Force Base, Colorado and the National Emergency Coordination Center (NECC) in Berryville, Virginia. These warning centers monitor various sources of information and issue warnings to state and local governments via the National Warning System (NAWAS).

U.S. Department of Agriculture (DoA)

The Farm Service Agency (FSA) of DoA helps stabilize farm income, aids farmers in conserving land and water resources, provides credit to new or disadvantaged farmers and ranchers, and helps farm operations recover from the effects of disaster.

In the aftermath of a natural disaster, FSA makes available a variety of emergency assistance programs to farmers in counties that have been designated or declared disaster areas. The agency can offer cost-share assistance to producers who do not have enough feed to maintain their eligible livestock because of a loss of a substantial amount of their normal feed production. Emergency loans are available to eligible farmers who suffer qualifying losses as a result of a natural disaster. And, to help rehabilitate farmland damaged by a natural disaster, FSA can often share the cost of some emergency conservation practices. In the event of a national emergency, FSA is responsible for assuring adequate food production and distribution as well as the continued availability of feed, seed, fertilizer, and farm machinery.

The Cooperative State Research, Education, and Extension Service (CSREES) works with partners and customers to advance research, extension, and higher education in the food and agricultural sciences and related environmental and human sciences to benefit people, communities, and the Nation. CSREES programs are administered through two interactive divisions. The first division, Scientific Programs, houses research and education efforts in plant and animal production, protection, and processing; natural resources and environment; rural, economic and social development; and children, youth, family, nutrition, and health. The second division, System and Policy Concerns, includes partnerships; competitive research grants and awards management; science and education resources development; and communication, technology and distance education.

U.S. Department of Commerce (DoC)

National Oceanic and Atmospheric Administration (NOAA) Western Region Seattle

The National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce, forecasts the Nation's weather, warns the public of impending severe weather and flooding, predicts climate change, protects endangered ocean species, and conducts scientific research to understand and preserve the environment. To achieve its mission, NOAA has developed a strategy that consists of seven interrelated strategic goals: environmental assessment and prediction, short-term warnings and forecasts, implementation of seasonal to interannual climate forecasts, prediction and assessment of decadal-to-centennial climate change, promotion of safe navigation, environmental stewardship, attainment of sustainable fisheries, recovery of protected species, and sustainment of healthy coasts. NOAA’s National Environmental Satellite, Data and Information Services (NESDIS) operates a satellite system that provides coverage of meteorological conditions in the tropics during the tropical cyclone season. The National Data Buoy Center operates a data buoy system and automated coastal wave monitoring stations. NOAA’s Pacific Tsunami Warning Center (PTWC) at Ewa Beach, Hawaii, and the

West Coast/Alaska Tsunami Warning Center (WC/ATWC) at Palmer, Alaska, monitor Pacific tide gauges and seismic activity and issue tsunami watches and warnings for the region. NOAA's Synoptic Analysis Branch (SAB) provides satellite support after an ash-producing explosive volcanic eruption is detected. Warnings are issued to pilots and aviation interests via the Federal Aviation Administration (FAA).

National Weather Service Alaska Region

National Weather Service, Alaska Region Headquarters, is located at 222 West 7th Avenue #23, Anchorage, Alaska 99513-7575.

Anchorage Weather Service Forecast Office

The WSFO is located at 6930 Sand Lake Road, Anchorage, AK 99503. The Anchorage Forecast Office is part of the Alaska Region of the National Weather Service and the National Oceanic and Atmospheric Administration.

National Weather Service Pacific Region

The National Weather Service Pacific Region Headquarters and International Tsunami Information Center are collocated in downtown Honolulu, Hawaii. The Honolulu Weather Forecast Office and Central Pacific Hurricane Center are now located at the University of Hawaii Manoa Campus. The Region's newest forecast office, NWSO Guam, is located in Barrigada, Guam.

Honolulu Weather Service Forecast Office

The mission of the National Weather Service is "to provide weather and flood warnings, public forecasts, and advisories for all of the United States, its territories, adjacent waters, and ocean areas, primarily for the protection of life and property. NWS data and products are provided to private meteorologists for the provision of all specialized services." The Honolulu WSFO is responsible for providing weather forecasts and warnings and functions as the Central Pacific Hurricane Center (CPHC), responsible for monitoring cyclones north of the equator and west of long. 140^{o} W.

The National Weather Service makes available to the PDC numerical model weather data and graphics covering the Central Pacific, high-resolution data covering the Hawaiian Islands, model output from the Aviation Model, the MRF, the Regional Spectral Model, model output or data to cover regional areas (e.g., Guam) and specialized fields such as open ocean waves and SST, NWS model data to include standard meteorological fields (winds, pressure, relative humidity, model forecast precipitation, and other fields), NWS Honolulu rain gage data, data from domestic rain gage HYDRONET, satellite images from GOES 9 and Japan's GMS, and NWS Honolulu generated text products.

The NWS will also provide NWS Honolulu radar estimated rainfall from the AMBER program when AMBER becomes fully operational. NWS will provide any software required to effectively display, use, and distribute AVN. MRF, RSM, or other NWS data. NWS may provide models to the PDC to integrate and run on the PDC system. The PDC would then provide the model results back to NWS. This occurs when mutually agreed upon by the PDC and NWS.

The PDC will not perform the functions of forecasting, prediction, and warning that fall under the charter of NWS.

The Meteorology Department at the School of Ocean and Earth Science and Technology, University of Hawaii at Manoa, provides instruction leading to the bachelor's, master's, or doctoral degrees in meteorology. The department's program in tropical meteorology is recognized as one of the three best in the world. This is attested to by the generous support of research, graduate students from and supported by Pacific and Asian countries, faculty membership of foreign Ph.D.'s committees and of international meteorological and oceanographic planning committees. Links with the People's Republic of China began in 1980. Since then the University of Hawaii has hosted eight faculty members and numerous graduate students and joined the PDC in planning cruises supporting Western Pacific air-sea interaction studies.

The University of Hawaii pursues an active research program closely integrated with instruction; both stress the special field of tropical meteorology. Besides the usual service functions to other departments and to the Department of Education, the department provides much of the advisory service previously performed in Honolulu by the regional climatologist of the National Weather Service. The department takes a rigorous approach to teaching and research in meteorology, recognizing the peculiar advantage and challenge presented by its mid-Pacific location. Thus, the oceanic and Asian tropics are emphasized, and close professional links are maintained with countries in the region. Teaching and research activities are closely interwoven and interdependent.

In courses and training seminars, the University of Hawaii educates and reeducates most of the National Weather Service meteorologists who are responsible for the state's day-to-day weather forecasts and severe weather warning. The University of Hawaii staff is active in the presentation of hurricane preparedness workshops for the state's governmental agencies and the news media. Studies of wind energy potential provide policy makers with sorely needed accurate information and educate the public in the process. Consultation and community service activity has expanded rapidly. No other group in the state in any way duplicates this service.

PDC plans to install a server at the NWS Forecast Office to provide direct connectivity between NWS and PDC. The PDC will collaborate with NWS on a joint PDC/Internet home page that will be resident on the PDC external Web server. The PDC will provide GIS data and products to NWS, as requested. The PDC will not perform the functions of forecasting, prediction, and warning that fall under the charter of NWS.

International Tsunami Information Center

Located in Honolulu, Hawaii, the International Tsunami Information Center (ITIC) was established in November 1965 by the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific, and Cultural Organization (UNESCO). In 1968, IOC formed the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU). The present 26 member states are Australia, Canada, Chile, China, Colombia, Cook Islands, Costa Rica, Democratic People's Republic of Korea, Ecuador, Fiji, France, Guatemala, Indonesia, Japan, Mexico, New Zealand, Nicaragua, Peru, Philippines, Republic of Korea, Russian Federation, Singapore, Thailand, Hong Kong (UK), United States, and Western Samoa.

ITIC monitors the activities of the Tsunami Warning System in the Pacific. The system makes use of numerous seismic stations, water level stations, and dissemination points scattered throughout the Pacific. The Tsunami Warning System in the Pacific is one of the most successful international cooperative programs with the direct humanitarian aim of mitigating the effects of tsunami by saving lives and property. ITIC maintains and develops relationships with all member states of the ICG/ITSU and the following organizations: IOC, International Union of Geodesy and Geophysics, World Meteorological Organization, World Data Centers A and B, International Council of Scientific Unions, United Nations Disaster Relief Organization, UNESCO, research and academic organizations, universities, and institutions worldwide.

ITIC informs local authorities of member states of developments in tsunami research and education. ITIC initiates, coordinates, or conducts technical training programs, workshops, and seminars dealing with all aspects of tsunami preparedness. ITIC aims to make authorities more aware of the tsunami hazard and to plan programs for protection of life and property and for evacuation from dangerous areas during times of tsunami warnings. ITIC informs the general public of the tsunami hazard through lectures, publications, educational materials, and disaster preparedness programs.

ITIC's public education program is directed toward coastal residents, their local officials, school teachers, the mass media, policy makers, and the general public. It includes lectures, audio-visual aids, seminars, posters, photographic displays, television and radio coverage, and publications. Under the ITIC Visiting Expert's Program, persons engaged in tsunami research, warning systems, or administration can train for up to six weeks at ITIC, the Pacific Tsunami Warning Center (PTWC) and other tsunami-related activities such as civil defense offices and seismic facilities. Scientists work on tsunami-related problems and familiarize themselves with the Tsunami Warning System and civil defense procedures. The Visiting Expert's Program is designed to train at least two experts at ITIC during a nominal 4-week training period in Honolulu every year. An IOC circular letter is issued prior to the training session advising ICG/ITSU member state national contacts of the requirements and dates of training and soliciting nomination of experts.

Furthermore, ITIC facilitates the exchange of scientific and technical personnel between member states for the purpose of providing training and familiarization with instrumentation, communication networks, civil defense preparedness activities, and new methods and procedures utilized by the Tsunami Warning System in the Pacific.

For each tsunami, ITIC assists the World Data Center in soliciting and collecting as complete a set as possible of seismic and tsunami wave records of the event, together with descriptive information and supplementary data. ITIC prepares and disseminates a report of each tsunami, which is included with the ITIC Newsletter. Whenever a tsunami occurs, ITIC solicits and collects water level records from selected gauging stations throughout the Pacific that have recorded a tsunami. ITIC maintains an extensive data file and library on tsunami. ITIC identifies research needed to improve tsunami forecasting, including the severity of impact. It cooperates with national scientific and professional organizations in encouraging and applying tsunami research. ITIC encourages, facilitates, and participates in the field investigation of tsunami, collecting measurements of maximum tsunami height and horizontal inundation, damage to buildings and facilities, and information on public response to tsunami warnings. It is developing a program of appropriate survey procedures in cooperation with the scientific community to provide instructions to all member states.

ITIC arranges for the availability of technical information on equipment required for an effective tsunami warning system. It ensures that knowledge of new technology is made available to all member states. It arranges for the provision of advisory and consultative services to member states wishing to upgrade their warning system capability. In close cooperation with the ad-hoc committees of ICG/ITSU, ITIC seeks improvements for the Tsunami Warning System in the Pacific.

In cooperation with the ICG/ITSU member states, ITIC prepares and publishes tsunami research reports and papers, newsletters, historical tsunami catalogs, glossaries, bibliographies, books, and educational materials. Its Tsunami newsletter is published twice a year and brings news and information to tsunami researchers, engineers, educators, and government officials. It is sent to subscribers around the world, with a total distribution of nearly 800 copies. Further information on ITIC and the Tsunami Warning System in the Pacific may be obtained from:

Director, International Tsunami Information Center Grosvenor Center, Mauka Tower 737 Bishop Street, Suite #2200 Honolulu, Hawaii 96813 USA tel: (808)532-6423 fax: (808)532-6425 Internet: itic@ptwc.noaa.gov

Pacific Tsunami Warning Center

The Pacific Tsunami Warning Center in Ewa Beach, Hawaii, serves as the regional Tsunami Warning Center for Hawaii and as a national/international warning center for tsunamis that pose a Pacific-wide threat. This international warning effort became a formal arrangement in 1965 when PTWC assumed the international warning responsibilities of the Pacific Tsunami Warning System (PTWS). The PTWS is composed of 26 international member states that are organized as the International Coordination Group for the Tsunami Warning System in the Pacific.

The objective of the PTWS is to detect, locate, and determine the magnitude of potentially tsunami-genic earthquakes occurring in the Pacific Basin or its immediate margins. Earthquake information is provided by seismic stations operated by PTWC, ATWC, the U.S. Geological Survey's National Earthquake Information Center, and international sources. If the location and magnitude of an earthquake meet the known criteria for generation of a tsunami, a tsunami warning is issued to warn of an imminent tsunami hazard. The warning includes predicted tsunami arrival times at selected coastal communities within the geographic area defined by the maximum distance the tsunami could travel in a few hours. A tsunami watch with additional predicted tsunami arrival times is issued for a geographic area defined by the distance the tsunami could travel in a subsequent time period.

If a significant tsunami is detected by sea-level monitoring instrumentation, the tsunami warning is extended to the entire Pacific Basin. Sea-level (or tidal) information is provided by NOAA's National Ocean Service, PTWC, WC/ATWC, university monitoring networks, and other participating nations of the PTWS. The International Tsunami Information Center, part of the Intergovernmental Oceanographic Commission, monitors and evaluates the performance and effectiveness of the Pacific Tsunami Warning System. This effort encourages the most effective data collection, data analysis, tsunami impact assessment, and warning dissemination to all TWS participants.

Tsunami watch, warning, and information bulletins are disseminated to appropriate emergency officials and the general public by a variety of communication methods.

Tsunami watch, warning, and information bulletins issued by PTWC and ATWC are disseminated to local, state, national, and international users as well as the media. These users, in turn, disseminate the tsunami information to the public, generally over commercial radio and television channels. The NOAA Weather Radio System, based on a large number of VHF transmitter sites, provides direct broadcast of tsunami information to the public. The U.S. Coast Guard also broadcasts urgent marine warnings and related tsunami information to coastal users equipped with medium frequency (MF) and very high frequency (VHF) marine radios. Local authorities and emergency managers are responsible for formulating and executing evacuation plans for areas under a tsunami warning. The public should stay-tuned to the local media for evacuation orders should a tsunami warning be issued. And, the public should NOT RETURN to low-lying areas until the tsunami threat has passed and the "all clear" is announced by the local authorities.

West Coast/Alaska Tsunami Warning Center

The West Coast/Alaska Tsunami Warning Center (WC/ATWC), located in Palmer, Alaska, serves as the Tsunami Warning Center for Alaska, British Columbia, Washington, Oregon, and California. Dedicated in September of 1967, the WC/ATWC is the nerve center for an elaborate, real-time, state-of-the-art network of seismic stations around the world and tide stations located throughout the Pacific Ocean. Using satellite telemetry, radio, commercial communications, and the Internet, seismic and sea level data are transmitted to the WC/ATWC for analysis and display. As a functional part of the National Oceanic and Atmospheric Administration's National Weather Service, the WC/ATWC's primary objective is to provide timely tsunami warnings, watches, advisories, and information to the people it serves 24 hours a day.

When a large earthquake occurs in the Pacific Basin, an automated system and the geophysicists at the West Coast/Alaska Tsunami Warning Center rapidly determine its epicenter (location) and magnitude. If the location and magnitude of the earthquake meet the known criteria for the generation of a tsunami, the WC/ATWC will issue an immediate "tsunami warning" for a limited area near the epicenter. This tsunami warning message includes predicted tsunami arrival times at selected coastal places in Alaska, British Columbia, and the U.S. West Coast. A tsunami warning places a restricted area (within 2-3 hours of the tsunami's arrival time) in a condition that requires all coastal areas in the region to be prepared for the possibility of immediate flooding from the tsunami. This warning is usually based only on seismic information without any tsunami confirmation. A "tsunami watch" is issued to areas adjacent to the warning area alerting them to a possible tsunami threat. After the issuance of the first tsunami warning and watch bulletins, geophysicists confirm whether or not a tsunami has been generated by examining data from the network of tide gauges located throughout the Pacific. Based on information gathered from tide gauges, subsequent bulletins are issued at least hourly, confirming the existence of a destructive tsunami and expanding the area in a tsunami warning and watch. The warning will not be canceled until the destructive tsunami dissipates. If the tide gauges show no tsunami or a non-destructive tsunami at the expected arrival times at the locations, the warning and watch are canceled.

The West Coast/Alaska Tsunami Warning Center works with the Pacific Tsunami Warning Center (PTWC). Tsunamis generated in areas outside WC/ATWC's area of responsibility, such as Japan or Chile, have also reached WC/ATWC's area of responsibility. PTWC, as at WC/ATWC, issues a warning for the immediate area of an earthquakes location. The two Tsunami Warning Centers coordinate on the information being disseminated.

In addition to the primary objective, the WC/ATWC personnel process and disseminate collected seismic and tide data, create and implement software necessary to expedite the issuance of tsunami warnings, conduct technique and equipment development to improve the present system for issuance of tsunami warnings, and carry on a community tsunami preparedness program. The West Coast/Alaska Tsunami Warning Center also serves as tsunami advisor to federal, state and local governments in their area of responsibility.

National Marine Fisheries Service Southwest Region

The Southwest Region's marine resource programs encompass over 1.3 million square miles of the Pacific Ocean. The Southwest Region is one of the National Marine Fisheries Service's five regional offices and five research centers located throughout the United States. Its programs assess, manage, and promote the conservation of living marine resources through these divisions.

Sustainable Fisheries Division - Administers fishery management, grant, trade, and industry services programs from the regional office in Long Beach, California, and the Pacific area office in Honolulu, Hawaii.

Habitat Conservation Division - Reviews and evaluates the impacts of water resource development activities on marine, estuarine, and anadromous fishery resources and the habitats which support them. The Habitat Conservation Program is responsible for habitat-related activities in all U.S. flag islands in the Pacific. Habitats of concern for fishery resources and threatened/endangered species include coral reefs, seagrass beds, benthic algae beds, and mangrove forests. Under authorities provided by the Fish and Wildlife Coordination Act, National Environmental Policy Act, Clean Water Act (Section 404), Rivers and Harbors Act (Section 10), Marine Protection and Sanctuaries Act, and others, NMFS interacts with and provides formal comments on public and private activities such as permit applications and construction projects. The program coordinator serves on numerous committees, working groups, and task forces. The program has recently provided expertise in expeditions to identify areas of marine habitat to place in protected status in the Federated States of Micronesia (FSM) and Republic of the Marshall Islands (RMI). The program coordinator is the DOC/NOAA representative on the Oceania Regional Response Team (RRT) to assess impacts from spills of oil and hazardous substances throughout the Pacific Islands.

Protected Resources Division - Responsible for conservation and management programs involving endemic and migratory marine mammals and endangered species populations adjacent to California and in southern, western, and eastern tropical Pacific Ocean. The Pacific Islands Protected Species Program operates under the authority of the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and other statutes to protect, enhance, and/or recover endangered and threatened species of sea turtles, monk seals, cetaceans (humpback whales and other listed whales), and other marine mammals. Commercial fisheries are monitored under the MMPA to ensure that incidental marine mammal take (injury and mortality) remains at levels sustainable by the affected populations. When necessary, regulations are developed to mitigate the adverse effects of human activities and can include such measures as area closures, closed seasons, gear restrictions, observers, harvest quotas, and limits on allowable levels of mortality of marine mammals. The program also works with ESA Section 7 consultations to ensure that federally funded, initiated, or permitted projects and activities do not jeopardize a threatened or endangered species or adversely affect designated critical habitat. Under the Compacts of Free Association with RMI and FSM, the United States is obligated to apply environmental standards

and procedures to U.S. Government activities, and to develop alternate standards and procedures to fulfill this obligation in consultation with and concurrence of the appropriate governments.

The program works closely with state and other federal agencies in the development of protective regulations and plans (e.g., Hawaii State Land Use District Boundary Review, Hawaii State Ocean Recreation Management (Thrillcraft) Regulations, State of Hawaii Pesticides/Endangered Species Protection Plan, Humpback Whale Sanctuary Management Plan, Coast Guard Area Response Plan for Oil Spills, Interim Hawaiian Sea Turtle Recovery Plan, Pacific Sea Turtle Recovery Plan, Hawaiian Monk Seal Recovery Plan, Humpback Whale Recovery Plan).

National Telecommunications and Information Administration (NTIA), University of Hawaii PEACESAT Program

NTIA provides assistance to the University of Hawaii, which operates the Pan-Pacific Educational and Cultural Experiments by Satellite (PEACESAT) project out of Honolulu. PEACESAT services include distance education programming between rural students and colleges, universities, and departments of education; exchange of economic development information among the Forum Fisheries member agencies; support of regional development activities of the South Pacific Commission; medical and environmental training and emergency communications support. In 1995, PEACESAT transitioned to the use of the GOES-2 satellite with the collaboration of NOAA. The transition was transparent and all users were able to align their antennas to see GOES-2. During 1995 and1996, in collaboration with the Pacific Basin Development Council, FEMA, and the Department of Interior, PEACESAT worked with the Pacific Caucus of Emergency Managers to implement the Emergency Management Network (EMN). The EMN was installed in 1996 in eight locations: the Commonwealth of the Northern Mariana Islands, Federated States of Micronesia (Chuuk, Kosrae, Pohnpei and Yap), Guam (University of Guam), the Republic of the Marshall Islands, and the Republic of Palau. American Samoa is expected to come online some time in early 1997.

PEACESAT began as a voice service operating in a "party line" mode where many users shared a single channel. The increasing importance of data communications, however, compels PEACESAT to address the "point-to-point" nature of digital technology. The Pacific islands users need more access to the digital services from PEACESAT-Honolulu as well as access to more features such as higher speed data, compressed video, and concurrent voice and data services, than is currently provided by the GOES system.

U.S. Department of Defense (DoD)

DoD policy provides that military forces not otherwise committed be available for assignment to assist civil authorities in restoring order and civil control and essential facilities to operational status, preventing unnecessary loss of life, and alleviating suffering. The DoD communicates with other federal departments, the state and county emergency operating centers (EOCs), and other emergency organizations. DoD provides emergency support through the Director of Military Support (DOMS). DOMS provides plans and resources in response to requests from civil authorities for military support. The Secretary of the Army serves as the Executive Agent for executing DOMS missions. Support areas include transportation, communications, public works and engineering, firefighting, information and planning, mass care, resource support, health and medical services, urban search and rescue, hazardous materials, and food and energy.

Commander in Chief, U.S. Pacific Command

USCINCPAC is located at Camp H.M. Smith, Oahu, Hawaii. The headquarters staff consists of some 530 Army, Navy, Air Force, and Marine Corps officers and enlisted personnel, plus 110 or so civil servants. About 1,500 people belong to additional support units such as the Asia-Pacific Center for Security Studies, the Information Systems Support Activity, the Pacific Automated Server Site Japan, the Cruise Missile Support Activity, the Special Intelligence Communications, the Joint Intelligence Center Pacific, the Joint Intelligence Training Activity Pacific, the Pacific Stars and Stripes, the Joint Interagency Task Force West, and the Joint Task Force Full-Accounting.

USCINCPAC is a unified command which includes approximately 304,000 military personnel from the Army, Navy, Air Force, and Marine Corps (about 20 percent of all active duty U.S. military forces). These forces are in three categories: forward-deployed (about 100,000) and forward-based, and CONUS-based, which comprise the remainder. Supporting (Service component) commands are:

U.S. Army Pacific (USARPAC)
-- 25th Infantry Division (Light)/U.S. Army, Hawaii (Hawaii/Washington)
-- U.S. Army, Japan/9th Theater Army Area Command (Japan)
-- U.S. Army Chemical Activity Pacific (Johnston Island)
-- 1st Brigade, 6th Infantry Division (Light)/U.S. Army, Alaska (Alaska)
-- 9th U.S. Army Reserve Command (Hawaii)

U.S. Pacific Fleet (CINCPACFLT)
-- Third and Seventh Fleets (California and Japan)

Marine Forces Pacific (MARFORPAC)
-- I Marine Expeditionary Force (California)
-- III Marine Expeditionary Force (Japan)

U.S. Pacific Air Forces (PACAF)
-- Fifth Air Force (Japan)
-- Seventh Air Force (Korea)
-- Eleventh Air Force (Alaska)
-- Thirteenth Air Force (Guam)

USCINCPAC provides support under DOMS tasking. This support provides resources and coordination with the other federal agencies included in the planning and execution phases of emergency management. Joint Task Force (JTF) 510 is the USCINCPAC crisis response, rapid deployment JTF. USCINCPAC can activate JTF 510 to deploy in response to a crisis situation to provide USCINCPAC an assessment, to recommend courses of action, and/or to conduct military operations. When activated, JTF 510 could respond to humanitarian assistance, disaster relief, and noncombatant evacuation or other contingency operations. Depending on JTF 510's initial assessment of the situation, USCINCPAC might choose JTF 510 as the crisis manager or may assign this task to a more robust JTF. In this latter case, JTF 510 facilitates the closure of this larger JTF and then transitions into a joint special operations task force (JSOTF). The JSOTF plans and executes special operations in support of the JTF commander.

Army Corps of Engineers

The Pacific Ocean Division, headquartered in Honolulu, Hawaii, consists of districts in Hawaii, Alaska, Japan, and Korea. The Alaska District designs and constructs facilities for the Army, Air Force, and on request, other federal agencies; develops and protects water resources; and manages environmental cleanup on former DoD sites. The district's AOR includes the entire state of Alaska, 586,000 square miles or one-sixth of the United States.

Naval Pacific Meteorology and Oceanography Center

On 12 August 1987, NAVWESTOCEANCEN moved from the Hale Moku housing area to a brand-new $4.7 million facility located in the CINCPACFLT Makalapa Crater Complex. The new building was constructed with the most up-to-date features available, including accommodations for a future second floor when the need arises. In June 1988, the Naval Satellite Display Station (NSDS) was installed, providing the Command with its first in-house satellite looping capability. The end of 1988 saw the establishment of Pearl Harbor's Mobile Environmental Team (MET). 1989 marked the arrival of the Joint Operations Tactical System (JOTS I), and in 1990, the upgrade to JOTS II, the first real-time tactical system seeing widespread fleet use. In August 1992 an uninterrupted power supply (UPS) was added to the center providing continuous "clear" power to the building in the event of commercial power loss.

In fiscal year 1994 the Naval Oceanography Command was reorganized as the Naval Meteorology and Oceanography Command (NAVMETOCCOM) under COMNAVMETOC-COM. NAVWESTOCEANCEN was renamed Naval Pacific Meteorology and Oceanography Center (NAVPACMETOCCEN) or "NPMOC." Today, NPMOC commands 19 Pacific Region activities employing MORE THAN 600 personnel and providing a wide range of meteorological and oceanographic support services to the fleet and to allies within the Pacific and Indian Ocean basins. A Meteorology and Oceanography liaison officer is assigned to USCINCPAC J319. As its mission implies, NPMOC "observes, analyzes, and accurately forecasts the meteorological and oceanographic battlespace, then delivers the right products on time."

Joint Typhoon Warning Center (JTWC)

Naval Pacific Meteorology and Oceanography Center West/Joint Typhoon Warning Center (NPMOCW/JTWC) Guam's AOR encompasses the marine areas of the Pacific and Indian Ocean basins (including the Arabian Gulf) from the southern tip of Africa to 60° S. along 17° E. on the western boundary. The Eastern boundary extends from the tip of the Kamchatka Peninsula diagonally to 40° N./160° E. to 20° N./160° E., then diagonally to the Equator at 155° W., then southward along 155° W. to 60° S. The northern boundary of the AOR is 66° N. JTWC's AOR boundary encompasses the northern and southern hemispheres from long. 180° E. longitude westward to the east coast of Africa.

JTWC's mission is to provide the highest quality meteorological and oceanographic (METOC) support to DoD resources and activities in the Western Pacific and Indian Oceans, including:

- Tropical cyclone warning service for U.S. Pacific Command and all U.S. Government agencies

- METOC services for all Seventh and Fifth Fleet afloat and ashore units, Third Marine Expeditionary Force, and Naval Special Warfare Unit One

- Joint METOC services for the National Security Agency

- U.S. Pacific and Central Commands, U.S. Forces Korea, U.S. Special Operations Command, and U.S. Transportation Command, when required

- Special intelligence communications and administrative services to U.S. Pacific Command Representative Guam and other local units

Tripler Army Medical Center

Tripler Army Medical Center is located in the state of Hawaii on the island of Oahu. The 2 million-square foot facility sits atop Moanalua Ridge overlooking Pearl Harbor to the west and Waikiki to the east. This 1.8 million square foot facility is the cornerstone of a vast network of military health care in Hawaii and around the Pacific. Patients are the men and women of America's armed forces, their families, and military veterans.

Tripler is more than a hospital. It is home to the Pacific Health Service Support Area, part of the U.S. Army Medical Command's new organizational structure. Tripler's contribution to military readiness has three parts: comprehensive health services, health education and research, and deployability. Tripler's vision is to be the premier health care system in the Pacific Basin.

Center of Excellence for Disaster Management and Humanitarian Assistance

The Center of Excellence in Disaster Management and Humanitarian Assistance (COEDMHA) was developed as a direct result of lessons learned in recent crises in the Middle East, Sub-Saharan Africa, and the Balkans. The Congressionally supported Center opened its doors in October of 1994. Its mission was to create a world-class center of excellence to address a global mandate for the provision and facilitation of education, training, and research in civil-military operations, particularly those requiring international disaster management and humanitarian assistance.

COEDMHA is a partnership of resources of the USPACOM, the Pacific Region Medical Command (PRMC) of Tripler Army Medical Center, and the University of Hawaii. Modeled after other academic centers of excellence, the COEDMHA provides scholarly and operational expertise through an international faculty recognized for its experience in international and regional humanitarian operations. The COEDMHA directly employs a staff which facilitates needs assessments, curriculum development, conferencing, training programs (both onsite and transportable), research, and an education-based electronic information network. In addition, the COEDMHA provides evaluation and development for disaster management and humanitarian assistance programs, especially where civil-military coordination is required. Dovetailing academic and operational knowledge, COEDMHA addresses the need for disaster management training (particularly civil - military) within the Asia-Pacific region, a region that has 59 percent of the world's population and 70 percent of the world's natural disasters. The COEDMHA also provides program consultation and program evaluation worldwide. The center of excellence is presently housed and sponsored by the PRMC, Tripler Army Medical Center.

U.S. Department of Energy (DoE)

The department's mission is to foster a secure and reliable energy system that is environmentally and economically sustainable, to be a responsible steward of the Nation's nuclear weapons, to clean up our own facilities, and to support continued U.S. leadership in science and technology. The Federal Radiological Emergency Response Plan covers any peacetime emergency that has radiological consequences within the United States and its possessions and is of sufficient magnitude to demand response by several federal agencies. The Nuclear Regulatory Commission (NRC) and the DoE participate in monitoring and responding to radiological emergencies. NOAA's National Meteorological Center provides atmospheric transport model products in the event of a nuclear accident. Regional offices of DOE:

- Alaska Power Administration, U.S. Department of Energy, 2770 Sherwood Lane, Juneau, AK 99801-8545
- Alaska Power Administration, Eklutna Project, U.S. Department of Energy, HC 02 Box 7785, Palmer, AK 99645
- Alaska Power Administration, Snettisham Project, U.S. Department of Energy, 2770 Sherwood Lane, Juneau, AK 99802-0050
- Department of Energy, Pacific Area Support Office, Hickam Air Force Base, Kamakahi Road Bldg. 3225, Honolulu, HI 96853

U.S. Department of the Interior (DoI)

Federal support of firefighting activities is coordinated at the National Interagency Coordination Center (NICC) in Boise, Idaho.

U.S. Fish and Wildlife Service, Region 1 (Hawaii) and Region 7 (Alaska)

The mission of the U.S. Fish and Wildlife Service is to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. The ecosystem Approach is a more effective way to address the service's mission and its extensive array of statutory responsibilities. The goal of the ecosystem approach is the effective conservation of natural biological diversity through perpetuation of dynamic, healthy ecosystems. As the service, working closely with others, carries out its mission and mandates, it will constantly strive to contribute to this goal. The service has chosen the U.S. Geological Survey's (USGS) hydrologic unit Map as the foundation for organizing and managing its diverse staff resources and program capabilities. This mapping strategy, based upon the delineation of watersheds, was chosen for several reasons. The service has identified 53 "ecosystem units" by grouping the USGS-defined watersheds. Ecosystem teams constructed ecosystem plans for each of these watershed-based ecosystem units. These plans include descriptions of the local ecological resources, such as fish, wildlife, and habitat, issues relevant to these resources (such as resource status and human impacts) and goals for local implementation of the ecosystem approach.

U.S. Geological Survey (USGS)

The principal federal agency with responsibility for assessing volcanic hazards and for monitoring active volcanoes in the United States is the USGS of the Department of Interior.

Alaska Volcano Observatory (AVO)

The Alaska Volcano Observatory (AVO) is a joint program of the USGS, the Geophysical Institute of the University of Alaska Fairbanks (UAFGI), and the State of Alaska Division of Geological and Geophysical Surveys (ADGGS). AVO is a cooperative organization that uses federal, state, and university resources to monitor and study Alaska's hazardous volcanoes, to predict and record eruptive activity, and to implement public safety measures. AVO presently focuses on the Cook Inlet volcanoes in the region of Alaska's greatest population and with important commercial international air transportation, oil and gas production, and tourism. Scientific investigations and monitoring logistics of Alaskan volcanoes are very expensive because no roads access any of the Alaskan volcanoes; work must be done with aircraft or locally chartered boats.

AVO has three primary objectives:

- To implement and maintain an effective program of volcano monitoring to detect signs of unrest at dangerous volcanic centers in Alaska
- To assess and publish reports on volcanic hazards and to conduct basic geological, geochemical, and geophysical investigations of Alaskan volcanoes
- To provide timely and accurate information on volcanic hazards, issue warnings of imminent activity, and distribute notice of eruptions to local, state, and federal officials and the public

Hawaiian Volcano Observatory (HVO)

To better understand Hawaiian volcanoes and the hazards they pose, the Hawaiian Volcano Observatory (HVO) was established in 1912 at the summit of Kilauea. The observatory, operated continuously by the USGS since 1947, studies current geologic activity at Hawaii's volcanoes as well as evidence of past eruptions, earthquakes, and other volcano hazards. HVO scientists use this information to provide timely warnings to local officials and the public, to assess long-term volcano hazards, and to make hazard-zone maps to guide land-use planning decisions.

The progress of Kilauea's current eruption is being closely tracked by HVO scientists. The information they provide on projected lava-flow movements helps public safety officials determine when it is necessary to evacuate residents or close roads. By helping to educate residents, public officials, and visitors about volcano hazards on the Hawaiian Islands, USGS scientists at HVO are enabling safer living in an area of spectacular volcanic eruptions and damaging earthquakes. The work of HVO is part of the USGS Volcano Hazards Program's ongoing efforts to help protect people's lives and property in all of the volcanic regions of the United States, including Hawaii, California, the Pacific Northwest, Wyoming, and Alaska.

During significant volcanic eruption events, the PDC provides backup support for the generation of graphic flow field maps when required by HVO. The PDC provides GIS graphic products created using a variety of data layers. These data layers may include population information,

infrastructure data, weather information, fire weather index data, imagery, and so forth, as required. The PDC provides response-oriented products to HVO showing evacuation routes, shelter locations, weather details, and other data as needed. It continues to provide Internet services to HVO via the T-1 communications link. The PDC provides HVO with access to county, state, and Federal agencies linked to the PDC interisland Intranet. The PDC works with HVO to investigate the feasibility of upgrading the video-conferencing capability between HVO and both PDC nodes.

The HVO will provide soft copy analysis products produced during seismic or volcanic events, as required, in formats coordinated between HVO and PDC. The HVO will provide GPS data coordinates for lava flows in progress directly to PDC via the T-1 interface. The HVO will provide PDC the output of lava flow models when it becomes available. Specific details of this data exchange will be coordinated between HVO and PDC. The HVO will provide postanalysis products derived from remote video camera imagery to PDC. The frequency of this data exchange will be coordinated directly between PDC and HVO. The HVO will provide the PDC with the electronic Catalog of Hawaiian Seismicity, updated periodically, via access to the HVO (internal/private) Web site. Access to the HVO Web site will be coordinated directly between HVO and PDC. The HVO will provide the PDC with near-real-time seismic notifications via the T-1 interface. The frequency of this data exchange will be coordinated directly between PDC and HVO.

The PDC will not perform the functions of prediction and warning that fall under the charter of HVO.

U.S. Geological Survey Water Resources Alaska District Office

The national mission of the U.S. Geological Survey's Water Resources Division is to provide the hydrologic information and understanding needed for wise use and management of the Nation's water resources. For nearly 100 years, the USGS has studied the occurrence, quantity, quality, distribution, and movement of the surface and ground water that composes the Nation's water resources. As the principal federal water-data agency, the Geological Survey collects and disseminates about 70 percent of the water data currently being used by numerous state, local, private, and federal agencies to develop and manage our water resources. This nationwide program, which is carried out through the Water Resources Division's 48 district offices and four regional offices, includes the collection, analysis, and dissemination of hydrologic data and water-use information, area resource appraisals and other interpretive studies, and research projects. Much of this work is a cooperative effort in which planning and financial support are shared by state and local governments and other federal agencies.

The Water Resources Division's activities in Alaska are divided into three broad categories. One category is the collection of hydrologic data required for planning and conducting hydrologic appraisals and (or) hydrologic research. In 1997, this type of work constitutes the major part of the division's efforts in Alaska. A second category is the conduct of hydrologic appraisals. These appraisals include studies of water resources in areas being or likely to be affected by mineral, energy, fisheries, coastal zone, or urban development; investigations of potential hydrologic hazards; and studies of ground- and surface-water contamination on federal lands. The third category is the conduct of basic and applied research in hydrologic topics unique to cold

climates. Subjects being studied include quantity and quality of surface and ground water; hydrologic instrumentation; glacier and snow and ice dynamics; and limnology.

U.S. Geological Survey Water Resources Hawaii District Office

The USGS is the Nation's largest earth-science agency and has the principal responsibility within the Federal Government for providing hydrologic information and appraising the Nation's water resources. Water-resource activities for the Hawaiian Islands and the western Pacific are conducted out of the district office in Honolulu and field offices in Hilo, Hawaii; Kahului, Maui; Lihue, Kauai; and Saipan, CNMI.

U.S. Geological Survey Pacific Islands Ecological Research Center, O'ahu, Hawaii

The Pacific Island Ecosystems Research Center (PIERC) works with federal, state, and local agencies and private organizations to provide objective research, baseline information, and technical assistance relating to conservation of indigenous biological resources within their cultural and sociological contexts throughout the State of Hawaii and the Pacific Island nations under U.S. jurisdiction. Established in October 1994, the center provides principal research services for the National Park Service (NPS) and the U.S. Fish and Wildlife Service (FWS), the two Department of the Interior agencies with programs in Hawaii and the central Pacific region. Research services are also provided to various agencies of the DoD in support of environmental concerns regarding their Pacific Basin trust holdings.

The functional units of PIERC are the center director and administrative office, located at the University of Hawaii in Honolulu, and the five field stations on the islands of Oahu, Maui, and Hawaii that for more than 25 years have served as research stations for the FWS and NPS.

The geographical isolation of the Hawaiian Islands has resulted in the evolution of a highly endemic biota: approximately 80 percent of Hawaii's plants, 100 percent of its forest birds, and 67 percent of its arthropods are found nowhere else in the world. But human colonization of the Islands has severely impacted native plant and animal populations--more than 75 percent of the historically known endemic bird species are now either extinct (23) or endangered (30). Of the nearly 1,300 endemic plant species described from Hawaii, 104 are considered extinct, and 267 of the remaining taxa are either listed or proposed as endangered or threatened species. The dramatic decline of these unique Hawaiian species is largely a result of habitat loss through land-use changes and competition from introduced plants and animals. As native ecosystems continue to be altered, even more Hawaiian plants and animals will be threatened with extinction.

Although none of the other Pacific Island ecosystems show the extremely high levels of endemicity seen in Hawaii, all of these archipelagos contain many unique species and habitats that are similarly threatened with decline or extinction. Because many management strategies developed in Hawaii are also applicable to other Pacific Island ecosystems, PIERC is developing research programs in Saipan, Guam, and the Commonwealth of the Northern Mariana Islands.

The principal areas of focus of PIERC research programs are determining the status of native plant and animal species and their ecosystems, obtaining basic information on the biology and ecology of these species, identifying factors currently limiting the distribution and abundance of native species, developing techniques to reduce or eliminate the effects of alien species on native biota, and helping interpret native ecosystem research results for the general public.

Field research is conducted in a wide variety of habitats in Hawaii from coastal ecosystems with their few remaining wetland and lowland communities, throughout the vast rain forests still found on the large islands, to the dry subalpine and alpine habitats on the island of Hawaii that reach up to nearly 14,000 ft in elevation.

National Parks Service, Alaska Region (Anchorage) and Pacific West Region Pacific Islands Support Office (Honolulu)

The mission of the National Parks Service is to promote and regulate the use of the "national parks . . .which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The National Park Service strives to meet those original goals while filling many other roles as well: guardian of diverse cultural and recreational resources; environmental advocate; world leader in the parks and preservation community; and pioneer in the drive to protect America's open space. The National Park System of the United States comprises 376 areas covering more than 83 million acres in 49 States, the District of Columbia, American Samoa, Guam, Puerto Rico, Saipan, and the Virgin Islands. These areas are of such national significance as to justify special recognition and protection in accordance with various acts of Congress.

U.S. Department of Transportation (DoT)

U.S. Coast Guard (USCG)

Commander, Pacific Area (COMPACAREA)

The Commander of the Coast Guard Pacific Area, which includes Alaska, Hawaii, and the Western Pacific (American Samoa, Guam, Saipan, Singapore and Japan), is headquartered in Alameda, California. Each numbered Coast Guard district is commanded by a Rear Admiral.

Fourteenth U.S. Coast Guard District

The boundaries of the Fourteenth Coast Guard District encompass the State of Hawaii and most of the Central and Western Pacific. Geographically, the Fourteenth District is the largest command in the Coast Guard, encompassing nearly 12.9 million square miles of land and sea from Hawaii to the Indian Ocean. The district was formed in 1939 in Hawaii with 250 people, but today more than 1,200 active duty, 140 Reservists, 85 civilians, and 528 auxiliarists serve in Hawaii, Guam, Japan, American Samoa, Saipan, and Singapore. These personnel carry out a variety of missions from the traditional bread-and-butter role of search and rescue (SAR) to environmental protection and maritime law enforcement. Search and rescue activities, spill management, and operation of maritime navigation and communications systems are the responsibility of the U.S. Coast Guard.

The Joint Rescue Coordination Center in Honolulu responds to calls for assistance from around the Pacific and directs assets to help with search and rescue. Assets can be Coast Guard and other military ships and aircraft, or with the Automated Mutual-Assistance Vessel Rescue System (AMVER), can also be civilian ships transiting an area where assistance is needed. Search and rescue operations in the Hawaiian Islands are coordinated by the Coast Guard's Group Honolulu Operations Center.

Marine safety offices in Guam and Honolulu inspect merchant vessels and port facilities and license vessel operators. The Marine Inspection Office in Japan and marine safety detachments in American Samoa, Saipan, and Singapore also inspect American-flagged ships and others destined for American ports. Each of these units also address oil pollution response and marine environmental protection.

Coast Guard cutters from around the district and aircraft from Air Station Barbers Point on Oahu routinely patrol the Pacific Ocean enforcing the Magnuson-Stevens Fishery Conservation and Management Act, which controls foreign fishing within the 200-mile exclusive economic zones of U.S. territories. These assets also help interdict vessels using illegal high-seas drift-nets and vessels attempting to smuggle illegal migrants into the United States.

Two buoy tenders and the aids-to-navigation team in Honolulu maintain more than 500 navigational aids district-wide. Included with these aids are seven lighthouses in Hawaii.

Seventeenth Coast Guard District

More than 2,000 Coast Guard personnel perform a wide variety of missions in the 17th District. The state spans the distance normally covered by four time zones and has a coastline larger than that of the East Coast. Forty-two Coast Guard units are stationed in Alaska. About 1,655 active-duty members serve in Alaska. Helping with the missions are 396 auxiliarists, 52 Reservists, and about 150 civilians. Because Alaska is a maritime state, the primary mission for the district is search and rescue. During fiscal 1993, the Coast Guard saved 200 lives, assisted 1,956 people and prevented the loss of property worth $5,731,000. Along with SAR, fisheries law enforcement is also an important mission in Alaska. Also in fiscal 1993, units working in the waters of Alaska conducted more than 1,400 boardings. There are 14 floating units stationed in Alaska: six 180-foot buoy tenders; five 110-foot patrol boats; two medium-endurance cutters; and one 65-foot buoy tender. One group office and two small boat stations with 41-foot utility boats round out the district's floating assets. Augmenting the district's law enforcement efforts are several medium- and high-endurance cutters that routinely patrol Alaskan waters from other West Coast districts. Six C-130 aircraft and 11 helicopters based out of Air Stations Kodiak and Sitka provide additional platforms for law enforcement, marine environmental protection, and SAR missions.

Alaska’s waterways are its lifelines, making environmental protection and marine safety a major concern. These various safety offices and their five detachments, along with Vessel Traffic Service Valdez, meet these concerns. Seven buoy tenders and an aids-to-navigation team maintain more than 1,255 navigational aids. Three of the district’s five loran stations are among the Coast Guard's last isolated units. These aids, like the men and women of the 17th District, stand by ready to serve the people of the “Last Frontier.”

Federal Aviation Administration Western Pacific Region

The Regional Administrator is responsible for maintaining oversight and for appraising overall mission accomplishment within the region. The Regional Administrator provides executive direction for local multiprogram issues including operational emergency activities and interfacing with industry, the public, and various Congressional offices and other government bodies at the regional level. The Chief of Staff serves as Acting Regional Administrator in the absence of the Regional Administrator. The Western Pacific Region comprises Hawaii, Guam,

American Samoa, CNMI, and the Trust Territories of the Pacific. The Western Pacific Region maintains a local coordinator for the Pacific Basin in Honolulu.

Federal Highways Administration Region IX

The Federal Highway Administration (FHWA) is part of the U. S. Department of Transportation and is headquartered in Washington, D.C. Its organization consists of Washington headquarters, regional offices, three federal lands highway division offices, and division offices across the United States. The FHWA Division structure includes 52 federal-aid division offices located in each state, the District of Columbia, and the Commonwealth of Puerto Rico. In addition, there are 52 motor carrier field elements, usually colocated with federal-aid division offices. Approximately 3,400 men and women make up the FHWA's workforce across this country. Region IX comprises Hawaii, Guam, and American Samoa.

The vision of the FHWA is to create the best transportation system in the world for the American people through proactive leadership, innovation, and excellence in service. FHWA also provides expertise, resources, and information to continually improve the quality of our Nation's highway system and its intermodal connections. FHWA undertakes this mission in cooperation with all of its partners to enhance the country's economic vitality, quality of life, and the environment.

The FHWA performs its mission through three main programs:

- The Federal-aid Highway Program provides federal financial assistance to the states to construct and improve the national highway system, urban and rural roads, and bridges. The program provides funds for general improvements and development of safe highways.

- The Motor Carrier Safety Program develops regulations and enforces federal requirements for the safety of trucks and buses to reduce commercial vehicle accidents. It also governs hazardous cargoes as they move over the Nation's highways.

- The Federal Lands Highway Program provides access to and within national forests, national parks, Indian reservations, and other public lands by preparing plans, letting contracts, supervising construction facilities, and conducting bridge inspections and surveys.

Multi-Agency Efforts and Tasks

The National Earthquake Hazards Reduction Program (NEHRP) is a nation-wide, risk reduction program whose member agencies include FEMA, USGS, the National Science Foundation (NSF), and the National Institute of Standards and Technology (NIST). Monitoring activities include the U.S. National Seismic Network and the Global Seismic Network, which provide worldwide earthquake monitoring coverage.

Regional State Emergency Management Organizations

State of Hawaii

The State of Hawaii Director of Civil Defense, under the direction of the Hawaii National Guard Bureau and the Governor, coordinates and directs the activities of all organizations for civil defense within the State of Hawaii. The State Civil Defense (SCD) Emergency Operating Center (EOC), located in Birkhimer Tunnel, Diamond Head Crater, assists the Director of Civil Defense in carrying out the responsibilities of direction and control of all civil defense operations. Currently, the SCD meets its information management needs through connectivity with organizations depicted in Figure 3-1.

The SCD and the county civil defense agencies (CDAs) develop plans that enable the state and counties to respond efficiently and effectively when a natural or manmade disaster threatens or occurs anywhere in the State of Hawaii.

The county CDAs represent the primary operational elements within the emergency response structure of state government. The Kauai, Oahu, Maui, and Hawaii CDAs develop and maintain appropriate emergency response plans and conduct preparedness training. They direct and coordinate response, assistance, and recovery operations within their jurisdictions. County CDAs maintain communications with each other, the state EOC, National Weather Service (NWS), and some state departments and agencies.

The departments and agencies of the state government work to develop disaster response plans. These plans include civil defense programs to protect the population from disasters and to ensure the continuity of essential functions. State departments and agencies communicate with each other and with the state and county EOCs. The following examples illustrate departmental disaster responsibilities: (1) The Department of Land and Natural Resources (DLNR) issues warnings of major fires on forest or grass land, and flood control problems. (2) The Hawaii National Guard supports communications requirements in disaster situations, assists with law enforcement, and supports mass care operations. (3) The Department of Social Services and Housing assesses mass care needs and coordinates activities of all levels of government and the private sector in disasters.

PDC interfaces within the State of Hawaii Department of Defense to State Civil Defense and the National Guard, to other state departments which typically perform FEMA emergency support functions aligned until a federal disaster decree, and to the counties via the PDC Intranet. Emergency managers can visit password-protected discreet sites on the PDC home page which are designed to support the special needs of each agency with easily downloaded information products preselected by event. One-stop shopping on the home page enables collection of crucial data such as watches, warnings, and advisories; tide information, satellite imagery, and progress maps detailing the movement of phenomena. PDC's ESD is an event-driven, online whiteboard and map generator coordination tool which enables multiple agencies to share timely situation reports during crisis. The automated tsunami watch model is run whenever PTWC issues an tsunami watch based on a moment magnitude of 6.5 or greater on the Richter Scale. A fire behavior model developed by U.S. Forestry Service and the Scripps Institution of Oceanography is run several times daily with data provided by the National Center for Environmental Prediction (NCEP). PDC can run the DoD Consequences Assessment Tool Set

(CATS) model for risk and consequence analysis related to hurricane and earthquake phenomena impacting the Hawaiian Islands. With the acquisition of advanced software, remote users will be able to query GIS map displays and call up select data layers to observe possible threat consequences. At present, PDC has a baseline set of 62 preapproved information products developed with the close cooperation of emergency managers and federal agencies in the region.

State of Alaska

Alaska's population of 606,000 makes it the third least populous state. The state also boasts the lowest population density in the Nation. There is 1.0 person per square mile (1991) in Alaska, compared to 71.2 people per square mile for the entire United States By far, Alaska's most important revenue source is the oil and natural gas industry, about 90 percent of the state's revenues. Alaska accounts for 25 percent of the oil produced in the United States. Located near Prudhoe Bay on the northern Alaskan coast is North America's largest oil field. Every day, millions of gallons of oil are removed from Prudhoe Bay and pumped through the Trans-Alaska Pipeline. The pipeline, maintained by Alyeska Pipeline Service Company, snakes its way from Prudhoe Bay on Alaska's northern coast to the south-central port of Valdez where the oil is pumped into tankers. One of the largest pipeline systems in the world, the Trans-Alaska Pipeline moves up to 88,000 barrels of oil per hour on its 800-mile journey to Valdez.

The state's vast amount of oil revenues are invested in the Alaska Permanent Fund, an inviolate trust belonging to the people of Alaska. The fund, managed by the Permanent Fund Corporation, was established in 1976 to generate perpetual revenues from nonrenewable sources for present and future generations of Alaskans. The seafood processing and fishing industries are also important to Alaska. The fishing and seafood industry is the state's largest private industry employer. Alaska's waters are rich in seafood. Most of America's salmon, crab, halibut, and herring come from Alaska. Forestry is important to Alaska's economy, especially that of the southeastern region. The timber industry, though currently undergoing much reform, provides thousands of jobs and hundreds of millions of dollars in revenue to Southeast Alaska. Hard rock minerals are one of Alaska's most important undeveloped natural resources, including coal, gold, silver, copper, and many others. According to the Alaska Miners Association, "Alaska now provides the greatest opportunity for minerals exploration and development in all of North America." Tourism is also one of the state's most important industries. Every year millions of people visit the state of Alaska.

The Division of Emergency Services operates under the auspices of the Department of Military and Veterans Affairs. The mission of the division is to minimize the loss of life and property from disasters. From its list of duties assigned in the Alaska Disaster Act, it is clearly the foremost agency within the executive branch of state government for assisting the Governor to fulfill the statutory responsibility of "meeting the dangers presented by disasters to the tate and its people."

Initially, PDC will provide Alaskan emergency managers with electronic access to a discreet password-protected site on the PDC home page. Eventually, tailored information products and creation of an Alaska-unique ESD may result from closer collaboration.

Pacific Insular States

The insular states in the Pacific Region each have their own emergency management organizations with responsibility for disaster management within their jurisdictions. American Samoa, the Commonwealth of the Northern Marianas, the Federated States of Micronesia, Guam, and the Republic of the Marshall Islands are provided disaster assistance by FEMA. The Republic of Palau is provided disaster assistance by NEMA. In 1988, emergency management representatives from the Pacific Insular States established the Pacific Caucus in order to provide a forum for cooperation on common emergency management issues. Hawaii State Civil Defense was instrumental in establishing the Pacific Caucus and has been thrust into a leadership role in the Pacific Region for emergency management matters. The Pacific Insular States communicate with federal agencies and the Hawaii SCD.

Private and Local Organizations

Local supporting organizations, public and private, paid and volunteer, assist the state and the counties in responding to disaster situations. Typical examples are the American Red Cross in their communication and coordination with FEMA and state/county EOCs; the Civil Air Patrol in their monitoring of military, state, and county EOC transmissions; public utilities in communication with both state and county EOCs; and amateur radio and citizens band volunteers working with state and county EOCs.

Appendix D

CURRENT PDC POINTS OF CONTACT WITH REGIONAL USERS

ORGANIZATION	POC	TITLE	PHONE
Federal Emergency Management Agency Region IX, Presidio, San Francisco, California	Diane Bona	Director (Acting)	415-923-7100
Federal Emergency Management Agency, Pacific Area Operations (PAO), Ft. Shafter, Oahu, Hawaii	Bill Carwile	Director	808-851-7900
U.S. Department of Agriculture, Cooperative Extension Service, College of Tropical Agriculture & Human Resources, University of Hawaii, Manoa, Oahu, Hawaii	Charlotte Nakamura	Interim Asst. Director	808-956-8397
U.S. Department of Agriculture, Farm Service Agency, Oahu, Hawaii	Jo-Anna Nakata		808-541-2644
U.S. Department of Agriculture, Forestry Service	Francis Fujioka	Research Meteorologist	908-680-1552
U.S. Department of Commerce, National Marine Fisheries Service, Oahu, Hawaii	Ray Sautter (Temp)	Enforcement Division	808-541-2727
U.S. Department of Commerce, National Oceanographic & Atmospheric Administration, Pacific Region	Richard Hagemeyer	Director, Pacific Region	808-532-6416
U.S. Department of Commerce, National Oceanographic & Atmospheric Administration, Region 6, National Weather Service Forecast Office Honolulu (Central Pacific Hurricane Center), Oahu, Hawaii	James Weyman	Meteorologist in Charge	808-973-5270
U.S. Department of Commerce, National Oceanographic & Atmospheric Administration, National Weather Service, Pacific Tsunami Warning Center, Eva, Oahu, Hawaii	Charles "Chip" McCreery	Geophysisist in Charge	808-689-8207
U.S. Department of Commerce, National Oceanographic & Atmospheric Administration, National Weather Service, West Coast/Alaska Tsunami Warning Center, Palmer, Alaska	Thomas Sokolowski	Chief	907-745-4212
U.S. Department of Commerce, National Telecommunications and Information Administration, University of Hawaii PEACESAT Program, O'ahu, Hawaii	Dennis R. Connors William Cooperman	Director/	202-482-5802
U.S. Department of Defense, CommanderinChief, U.S. Pacific Command, Camp H.M. Smith, O'ahu, Hawaii	Col. Mills/LCDR. Sean Connors	J-32/J-56	Mills 808-477-5027/6735 Connors
U. S. Department of Defense, U.S. Army Corps of Engineers, Pacific Ocean Division, Honolulu, O'ahu, Hawaii	James H.S. Lee/Steve Yamaoto	Chief, Emergency Management Division	808-438-1673 James/8866 Steve
U. S. Department of Defense, Joint Typhoon Warning Center, Guam ***JTWC will be moving to Pearl Harbor in 1998***	W. Tyson Aldinger, CPTN	Commanding Officer	808-471-0363
U. S. Department of Defense, U.S. Navy, Navy Pacific Meteorology and Oceanography Command, Makalapa, O'ahu, Hawaii	W. Tyson Aldinger, CPTN	Commanding Officer	808-471-0363
U. S. Department of Defense, U.S. Army Tripler Medical Center, Honolulu, O'ahu, Hawaii	Alonzo "Robbie" Robinson	Readiness, Plans & Mobilization	808-433-1417

ORGANIZATION	POC	TITLE	PHONE
U. S. Department of Defense, Center of Excellence for Disaster Management and Humanitarian Assistance (TAMC), O'ahu, Hawaii	Frederick "Skip" Burkle/ Robin Hayden	Director	808-433-7305Skip/1433Robin
U.S. Department of Energy (DoE), Pacific Area Support Office, Hickam Air Force Base, Kamakahi Road Bldg. 3225, Honolulu, O'ahu, Hawaii	William D. Jackson	Program Liasion Officer	808-422-9211
U.S. Department of the Interior, Fish and Wildlife Service, O'ahu U. S. Department of the Interior, U.S. Geological Survey, Alaska Volcano Observatory, Anchorage, Alaska	Terry Keith	Scientist in Charge	907-786-7456
U.S. Department of the Interior , U.S. Geological Survey Hawaiian Volcano Observatory, Kilauea, Hawaii	Arnold Okamura	Scientist in Charge	808-967-7328
U.S. Department of the Interior, U.S. Geological Survey Water Resources Division, O'ahu, Hawaii	William Meyer	District Chief	808-522-8290
U.S. Department of the Interior, U.S. Geological Survey Pacific Islands Ecological Research Center, O'ahu, Hawaii	Dr. Bill Steiner	Director	808-956-5668/5691
U.S. Department of the Interior, National Parks Service, Pacific Islands Cluster, O'ahu, Hawaii	Melia Lane-Kamahele	GIS Department Head	808-541-2693
U.S. Department of Transportation, Commander, 14th Coast Guard District, Honolulu, O'ahu, Hawaii	CDR Jack Rutz/ Jesse Smith	Commanding Officer/Special Agent	808-541-2259
U.S, Department of Transportation, Federal Aviation Administration, O'ahu, Hawaii	Tom Rea	Pacific Representative	808-541-1239
U.S. Department of Transportation, Federal Highway Administration, O'ahu, Hawaii	Abe Wong	Division Administrator	808-541-3646
U.S. Department of State, East-West Center, University of Hawaii, Manoa, O'ahu, Hawaii	Kenji Sumida	President	808-944-7103
U.S. Department of State, Office of Foreign Disaster Assistance	Mr. T. Dolan		(202) 712-5703
State Organizations			
State of Alaska, Department of Military & Veterans Affairs, Division of Emergency Services, Anchorage	Bob Heavelin	Director of Emergency Services	907-428-7058
State of Hawaii Department of Defense/National Guard, Fort Ruger, O'ahu	Col Vern T. Miyagi	Plan Operations Mitigation Support Officer	808-733-4112/4115
State of Hawaii Department of Defense/Civil Defense, Diamond Head Crater, O'ahu	Richard Flagg	PREMIS Manager	808-733-4300
State of Hawaii Department of Land and Natural Resources, O'ahu	Mike Wilson	Chairperson	808-587-0400
State of Hawaii Department of Business, Economic Development & Tourism (Energy Resources & Technology Division), O'ahu	John Tatlinger/ James Bac	Energy Planner/ Energy Analyst	808-587-3803

ORGANIZATION	POC	TITLE	PHONE
Hawaii Hurricane Relief Fund, O'ahu	Scott Clawson/ Keen Muranaka	Market Specialist	808-586-3109
Local and Private Organizations			
County of Kauai Civil Defense Agency	Cayetano "Sonny" Gerado	Civil Defense Administrator	808-241-6336
City and County of Honolulu Civil Defense Agency	Joe Reed	Administrator	808-523-4121
County of Maui Civil Defense Agency	Sel Menor	Civil Defense Administrator	808-243-7285
County of Hawaii Civil Defense Agency	Harry Kim	Administrator	808-935-0031
American Red Cross	Glenn Lockwood	Director for Disasters Services	808-732-3430
Salvation Army	Maj Steve Hartt	Administrator	808-522-8499
Volunteer Organizations in Assistance to Disasters (VOAD)	Pastor Denny Grady		808-595-3731

ORGANIZATION	POC	TITLE	PHONE
Civil Air Patrol	Gecrge Texido		808-836-3417 Pgr: 808-526-8804
Coast Guard Auxiliary	Kent Bond Lt. Lou Magyar	Chief Auxiliary Branch Operations Division	808-541-2500
Police			
Maui County	Howard Tagamori	Chief of Police	244-6300
Kauai County	George Freitas	Chief of Police	808-241-6717
City and County of Honolulu	Lee Donohue		
Hawaii County	Wayne Carvalho	Chief of Police	808-961-2243
Fire			
Maui County	Ron Davis	Fire Chief	243-7561
Kauai County	David Sproat	Fire Chief	808-241-6500
City and County of Honolulu	Anthony J. Lopez Jr.	Fire Chief	808-831-7771
Hawaii County	Nelson Tsuji	Fire Chief	808-961-8297
Emergency Medical Services			
Maui County	Donna Maiava	Program Manager	733-9210
Kauai County	State Only -No County Emerg. Svcs.		
City and County of Jonolulu			
Hawaii County	Nelson Tsuji	Fire Chief	808-961-8297
Lifeguards			
Maui County	Marian Feenstra	Chief of Aquatics	871-2944
Kauai County	Orlando Anaya	Water Safety Supervisor	808-241-6668
City and County of Honolulu			
Hawaii County	George Yoshida	Director Parks/Recreation	808-961-8311

ORGANIZATION	POC	TITLE	PHONE
Pacific Insular States			
America Samoa			
Federated States of Micronesia			
Guam	J. Rosario E. Lujan	Director, Civil Defense/ Office of Planning, Head GIG Division	671-475-9600 671-472-4201
Marshall Islands			
Commonwealth of the Northern Marianas Islands			